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**THE
WORLD BOOK
ENCYCLOPEDIA**

**IN EIGHTEEN VOLUMES
AND READING AND STUDY GUIDE**



VOLUME 18

**WX
YZ**

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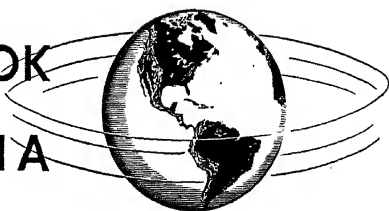
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THE WORLD BOOK ENCYCLOPEDIA



Ww

5399

is the twenty-third letter of our alphabet. Neither the ancient Semites nor the Greeks had this letter, since the sound of *W* did not occur in either language. The Romans did use this sound, but they used the letter *V* to represent the *W* sound in writing their language. In the Latin

FROM PICTURE TO LETTER



Egyptian	Sinai	Phoenician	Greek	Roman
3000 B.C.	1850 B.C.	1200 B.C.	600 B.C.	A.D. 114

of the Middle Ages, the letter *V* came to be pronounced with the *W* sound. Then a new letter was needed to represent the sound of *W*. It was formed by doubling the *V* and was written either *VV* or *UU*. Our letter *W* uses the double *V* form but it has the name of double *U*. *W* has only one sound in English, although in some words it is written but not pronounced. Examples of these words are *answer, sword, two, wholly*. See also ALPHABET; PRONUNCIATION. E.F.D.

WABASH COLLEGE is a privately controlled liberal arts school for men at Crawfordsville, Ind. Courses offered lead to bachelors' degrees. At the end of their second year, students choose one of the following four divisions in which to do their most important study: sciences and mathematics, foreign languages, social sciences, and English literature and speech. More than half the students live in fraternity houses. Others live in college dormitories or in approved rooming houses. The college was founded in 1832 and opened in 1833. The school has an average enrollment of about 400. F.H.Sr.

WABASH RIVER. The Wabash is the main waterway of Indiana. It rises in western Ohio and flows northwest into Indiana, then turns west to Logansport, and south to the Ohio River. The Wabash forms part of the boundary between Illinois and Indiana in the lower part of its course. River boats can use the Wabash as far as Terre Haute, Ind., which is 250 miles from its mouth. The old Wabash and Erie Canal runs parallel with the Wabash River from Terre Haute to Huntington, Ind. The river drains an area of 33,725 square miles. The Wabash is mentioned in many songs about Indiana, including Paul Dresser's *On the Banks of the Wabash*.

The White River is the main branch of the Wabash. Indianapolis, the capital of Indiana, lies on the West Fork of the White River.

L.D., Jr.

WAC. Members of the Women's Army Corps are often called WACS. The reserve was created on May 14, 1942, as the Women's Army Auxiliary Corps. The name was changed to the Women's Army Corps on July 1, 1943, and the corps became a part of the Regular Army. In September, 1945, more than 100,000 women were serving as WACS, more than 15,000 of them in fifteen foreign countries.

WACS received their basic training at Fort Des Moines, Iowa; Fort Oglethorpe, Georgia; Daytona Beach, Fla.; Fort Devens, Massachusetts; and Camp Ruston, Louisiana. Specialist schools taught photography, code, communications, and radio. Training was given for such positions as clerks, cooks and bakers, secretaries, jeep and truck drivers, weather observers, Link training plane instructors, chemical warfare instructors, small arms repairers, and hospital aide. WAC officer-training schools were conducted at Fort Oglethorpe, Georgia, and Fort Des Moines, Iowa.

The usual WAC uniform is a khaki blouse and skirt,



Ewing Galloway

The United States Army WAC was the "girl behind the gun" in World War II. WACS relieved many soldiers at desk jobs in the states, and thus increased the number of men who were available for combat duty. Almost every important camp in the United States had a WAC detachment.

and a jaunty billed cap. Their insignia is the head of Pallas Athene, goddess of wisdom and victory, which is worn on the lapel. The highest officer in the WAC holds the rank of colonel.

All WAC enlistments were discontinued in August, 1945. But women who served in the corps and were discharged were permitted to re-enlist until June, 1947. In 1948 Congress enacted legislation making the WAC a permanent part of the Regular Army.

See also HOBBY, OVETA CULP.

WACCAMAW, *WAK ah mau*, **RIVER**, a tributary of the Pee Dee River in eastern South Carolina. See PEE DEE RIVER.

WACHT AM RHEIN, *VAHKT ahm RINE*, **DIE**, is the name of a German patriotic song. It means "The Watch on the Rhine." It was written by Max Schneckenburger in 1840, when it was feared that the left bank of the River Rhine would fall into the hands of the French. The music was composed by Karl Wilhelm in 1854.

WACHUSETT, *waw CHOO set*, **DAM** is a water-supply project located on the Nashua River, a few miles from Clinton, Mass. It is the third largest earth-fill dam of the concrete rubble masonry type in the United States. Wachusett Dam is 207 feet high, and 971 feet along the crest. It handles a volume of 5,500,000 cubic yards of water. The dam, built under the authority of the Metropolitan Water District of Massachusetts, was completed in 1906 at a cost of \$2,378,206. See also DAM.

WACO, *WAT koh*, Tex. (population 55,982), is one of the leading inland cotton markets of the United States and an important industrial center of central Texas. Waco lies on the Brazos River about a hundred miles south of Dallas.

The city is the shipping center for a farming region which produces large quantities of grain and hay, fruits and vegetables, livestock, and poultry. Waco industries manufacture dairy and cottonseed products, textiles, tires, saddles and harness, glass products, furniture, wood products, laundry and dry-cleaning machinery, iron and steel products, cement, and concrete pipe.

Waco is the home of Baylor University, the oldest university in Texas; Catholic Sacred Heart Academy; and Paul Quinn College for Negroes.

Waco was laid out in 1849 on the site of a deserted village of the Waco Indians. The city was incorporated in 1856. Waco adopted the council-manager form of government in 1924, but returned to a major-council government in 1946.

S.A. MACG.

WAC SERVICE MEDAL. See DECORATIONS AND MEDALS (Service Medals of the United States).

WADAI, *wah DI*, is a territory in Africa. It lies south of the Sahara and west of the Anglo-Egyptian Sudan. It was formerly an independent Moslem sultanate, but today it is controlled by France as part of the Chad colony. Wadai covers an area of about 170,000 square miles, and has a population of about 453,000. The people are chiefly Negroes, Arabs, and half-castes.

WADI, *WAH dih*. In the Near East and northern Africa, a wadi is a gully or ravine through which a stream flows in the rainy season. Wadis are often formed by sudden bursts of heavy rainfall rushing out of narrow canyons over desert sand. In Arabic the word *wadi* means ravine.

WAFD. See EGYPT (Government).

WAFS. See WASP.

WAGER, *WAT jer*. A wager is a bet, or anything which is risked on the outcome of an event or the answer to a question. The persons who bet against each other may risk a sum of money or some other property, or they may agree that the loser shall do a certain thing, such as pushing the winner around the block in a wheelbarrow. Most losers of a wager involving money or other property feel that they owe a debt of honor, and should pay it. But the law does not require the loser to pay a wager except in those countries and states where certain kinds of gambling are lawful. See also GAMBLING; LOTTERY.

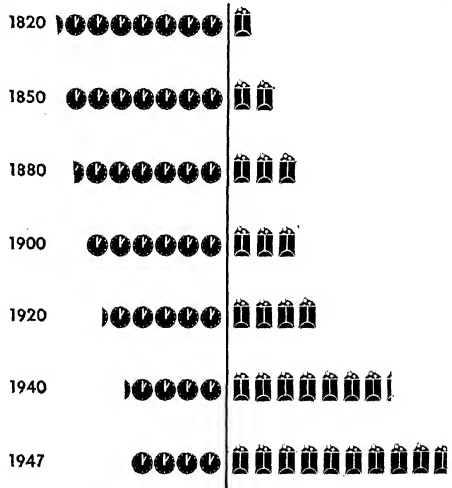
J.S.ME.

WAGES AND HOURS. Wages are the prices paid for the services of labor. Hours are the normal working period of labor, usually figured by the day or the week. Both wages and hours are important not only to the workers themselves, but also to employers. The wages of workers determine their ability to buy the goods of industry, and the hours of labor affect the efficiency of workers.

Wages. There are many theories about the level of wages. At one extreme is the theory of Karl Marx that the laborer should get nearly all the value of the goods or services he makes possible. At the other extreme is the theory which agrees with Marx that labor is a commodity like any other raw material, but insists that this labor should be bought as cheaply as possible, regardless of the effect on the worker.

It is generally agreed by most economists whose ideas lie between these extremes that the level of wages depends on the productivity of labor and the price of the products. The productivity, or output, of labor de-

Working Hours and Wages In U. S. Industry



Each clock represents
10 weekly hours

Each pay envelope represents
\$5 weekly earnings

Based on Government Statistics

PICTOGRAPH CORPORATION

pends upon three basic factors: (1) individual skill and energy (which are affected by training, by natural aptitudes, and by the disposition to work effectively); (2) the number of hours worked per day or per year; and (3) the efficiency of management and of the tools with which labor is supplied.

The efficiency of labor's tools is responsible for the marked increase in the output of labor during modern times. This has been responsible for a corresponding, but not always comparable, increase in wages. Between 1923 and 1937, for example, man-hour output in manufacturing increased 50 per cent, in mining 90 per cent, and in public utilities as much as 110 per cent. Meanwhile yearly wages increased about 5 per cent, and the number of hours worked decreased 20 per cent.

Wage rates are also affected by the supply of labor in relation to demand. If the birth rate is high or immigration is great, the number of workers available may be so abundant that the employer need do little bidding for workers. When labor is scarce, the workers are able to make a better bargain with their employers. The growth of labor unions during modern times has also helped increase the level of wages, since labor unions are generally able to bargain for the workers better than they can do for themselves individually. The Federal Fair Labor Standards Act has also served to increase general wage levels.

There is a difference between money wages and *real wages*. Real wages are determined by the amount of goods and services the worker can buy with his wages. For instance, a worker receiving \$100 a week may obtain an increase to \$110. But if the prices of goods increase generally 10 per cent, he is receiving no more real wages at \$110 a week than he was when he was earning \$100.

Hours. Before the Industrial Revolution, work days of twelve, fourteen, and even sixteen hours a day were common. Later, the ten-hour day and the six-day week became the normal working period both in Europe and in the United States. Agitation by labor for an eight-hour day began about 1888, but did not meet with much success until after World War I. During the 1930's, the five-day, forty-hour week, came into general practice. Some national labor organizations then advocated a thirty-hour week.

Shorter working hours generally are a means of spreading employment among the workers, whose individual output has been greatly increased by mass-production methods.

R.D.P.

See also LABOR; LABOR, DEPARTMENT OF; MINIMUM WAGE; PROFIT SHARING.

WAGES AND HOURS LAWS. See CHILD LABOR (In the United States); LABOR, DEPARTMENT OF; WAGES AND HOURS.

WAGGONER, WAG un er, THE. See AURIGA.

WAGNER, VAHG ner, RICHARD (1813-1883), was a German composer, poet, and essayist. He was the outstanding operatic composer of the 1800's and one of the greatest of all time. His artistic methods as the creator of a new type of music drama have had a deep and lasting influence on the opera. Like many other men of great genius, Wagner did not gain popular acceptance of his ideas at first. It was only toward the latter part of his



One of a series of events in the lives of immortal composers, painted for the Magnavox collection by Walter Richards.

Richard Wagner Listening to the Captain's Story while a violent storm rages in the English Channel. The captain told the legend of the Dutch sea captain who defied the devil. There, as the wind shrieked and the water smashed over the bridge, Wagner was inspired to write an opera. A short time later the world first heard *The Flying Dutchman*.

life that the public began to appreciate his work. Today Wagnerian operas are considered part of the world's greatest music. During his lifetime Wagner, the supreme egoist, knew that he was the greatest living composer and one of the immortals, and the fact was that he was actually as great as he himself thought.

Wagner was born in Leipzig, six months before his father died. His mother later married Ludwig Geyer, an actor, poet, and portrait painter. The family then moved to Dresden. Young Richard went to school there.

First Steps in Wagner's Career. In 1821 Wagner's mother returned to Leipzig after her second husband's death. There Richard began to study music. When he was nineteen he composed a symphony. His first opera, *Die Feen*, was finished in 1834, but it was never performed. At the age of twenty he became an orchestra conductor, and continued to compose. For a long time he made little money. In 1836 he married Minna Planer, an actress, from whom he was later separated. In 1839 Wagner met Giacomo Meyerbeer, an influential dramatic composer. He introduced Wagner to a number of important persons.

In 1840 he completed the libretto, or story, and musical score of *Rienzi*, his first opera to be performed. It was not accepted in Paris, but two years later it was successfully produced in Dresden.

First Great Producing Period. Wagner was encouraged by this success, and he presented *The Flying Dutchman* the following year. It was another success, but the audience did not understand it very well because it was written in a new manner. Both *Rienzi* and *The Flying Dutchman* were presented in several cities. Wagner was made director of music at the Dresden Theater in 1843. *Tannhäuser* was produced in 1846, but it was received coldly. Many openly criticized it. People still liked the gay Italian style of opera. Wagner's operas did not contain the flashy melodies and meaningless words of Italian opera. They told stories which were deep and serious. They were mostly based on old Teutonic legends. These stories expressed the German spirit which Wagner felt so keenly. At this stage in Wagner's life he

realized he had to try to get people to understand and appreciate his new form of opera. This period was probably the beginning of Wagner's greatness.

Wagner lived in a time of revolutionary artistic and political ideas. He felt compelled to express his ideas in music and writing. He even took part in the political uprising in Dresden in 1848. For this he was branded as a political outlaw and was exiled from Germany. He fled to Paris, and then to Switzerland. There he remained until 1859, doing much writing and composing. He was greatly influenced by the works of William Shakespeare, Friedrich Schiller, Johann Goethe, and most especially the pessimistic philosopher, Arthur Schopenhauer. He and the young German philosopher, Friedrich Nietzsche, became very good friends for a while. But in later years their friendship broke off and Nietzsche became a strong opponent of Wagner's ideas in art and philosophy.

During this period in Wagner's life he wrote the famous opera *Lohengrin*. He became friends with the composer, Franz Liszt, who presented this opera in 1850 at Weimar. Its success encouraged Wagner to begin work on another great legend, the masterly series of operas called *The Ring of the Nibelung*, or *Nibelungenlied*. In 1861 Wagner was permitted to return to Germany.

Second Period. During the second period of Wagner's life, he produced *Tristan and Isolde* and *Die Meistersinger*. He had many financial difficulties throughout his life, and in 1865 he was forced to flee from Vienna because of debt. Help came from young King Ludwig of Bavaria, who invited him to his kingdom. King Ludwig gave him a pension, a house, and a commission to plan a great theater at Munich. But in 1865, political enemies forced Wagner to flee to Switzerland.

In 1870 Wagner married Cosima von Bülow, the daughter of Franz Liszt. He wrote the *Siegfried Idyll* in honor of her birthday. It was performed on the staircase of their home on Christmas morning of that year.

Wagner was anxious to see the entire *Ring of the Nibelung* performed. But it was an immense series of four operas: *Das Rheingold*, *Die Walküre*, *Siegfried*, and *Die Götterdämmerung*. Wagner had spent twenty-six years working on this famous group. There was no opera house in Germany large enough to stage the series. The city of Bayreuth finally built a theater especially for these operas, and in 1876 Wagner moved there.

The *Ring of the Nibelung* called for vast and expensive scenery. The orchestra was hidden from the audience so that it would not attract attention to itself. Various new musical instruments were added for dramatic effects. For the first time, the opera used *melos*, or endless melody, gliding from one act to another, to make a harmonious whole. Wagner revolutionized staging, direction, and other arts connected with opera.

In 1882 Wagner finished his last opera, *Parsifal*, which was based on the legend of the Holy Grail. He had not been well for a number of years, and in 1883 he died. He was buried in a tomb in his garden.

Wagner's Greatness. The remarkable Wagner was a great composer, playwright, and poet at the same time. Before his time, operas were regarded merely as stories set to music. But Wagner combined words and music

to make a unified and powerful form of music drama. The music of his operas belongs entirely to the stories, which are told in inspired poetic form. The popular use of the *leitmotif* springs from its success in *The Ring of the Nibelung*. The *leitmotif* is a leading theme or melodic phrase which identifies a certain idea, person, or situation to the listener each time it is repeated.

Wagner so completely unified the music drama that it became one of the highest forms of creative art. He composed eleven operas, many other instrumental compositions and songs, and wrote a great deal of prose.

Years later, when the Nazis of Germany came to power, they adopted for their own use the same legends Wagner used in his operas. Wagner's music and many of his ideas were used to create a warlike spirit. But the evil touch of the Nazis could not mar the beauty of Wagner's music. Hitler loved Wagner's music, especially *Die Meistersinger*. He thought he was like the hero Walther who came out of the unknown to lead the German people. In reality, Walther was good, and not like Hitler in any way.

K.N.

See also OPERA (Development of the Opera; Some of the Famous Operas).

WAGNER ACT, or NATIONAL LABOR RELATIONS

ACT. See INDUSTRIAL RELATIONS; LABOR UNION; NATIONAL LABOR RELATIONS BOARD; UNITED STATES, HISTORY OF (Progress in Labor and Industry).

WAGNER MEMORIAL LUTHERAN COLLEGE is a coeducational liberal arts school on Staten Island, N.Y. It is controlled by the United Lutheran Synod of New York. The college offers special nursing, premedical, and pretheological courses. Wagner was founded in 1883 at Rochester, N.Y., as a preseminary college. It became a liberal arts college in 1928. Its average enrollment is about 300.

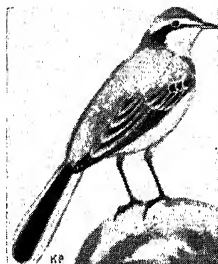
WAGNER VON JAUREGG, John YOU rek, JULIUS (1857-1940). See FEVER, ARTIFICIAL.

WAGON. The wheel and the wagon developed at the same time. This was at least six thousand years ago, when man first found that he could pull his sledges more easily if he fitted them with wheels cut from the rounds of tree trunks. The ancient Egyptians were among the earliest people to use wagons. At first, these were two-wheeled carts and chariots. The Scythians wandered over the plains of southeastern Europe as early as 700 B.C., carrying their possessions on two-wheeled carts covered with reeds. The Greeks and the Romans developed carts which were lighter and faster than those of the Egyptians. Until the Middle Ages wagons were no more than boxes set upon axles between wheels. Then the four-wheeled coach was developed in England. The first wagons were introduced in the United States by the English governors of the American colonies. Stagecoaches began to run over colonial roads about the time of George Washington. The covered wagon, which was first built by the Dutch farmers of Pennsylvania, was used in the development of the American West. These wagons were called "prairie schooners." Heavy farm wagons carried crops to market until the development of the motor truck in the early 1900's. Light wagons are still used for many purposes on farms today. The huge, modern truck trailer of the highways is really a sort of a wagon hitched to a

truck cab. See also CONESTOGA WAGON.

F.M.R.

WAGTAIL is the popular name for a small, long-tailed, insect-eating songbird. Many kinds of wagtails live throughout the Old World. One kind summers in western Alaska as well as in northeastern Siberia. Wag-



The Wagtail is a shy little bird whose tail seems to move constantly, whether the bird is walking or standing still.

bunches of grass. The nest is woven of roots and grass, and lined with moss and animal fur. The pipit, or titlark, of America belongs to the same family as the wagtails. See PIPIT.

A.A.A.

Classification. The wagtails belong to the family *Motacillidae*. The yellow wagtail is *Budytes flavus*.

WAHABI, WAHABEE, or WAHHABI. See IKHWAN.

WAIBLINGEN, VI bling en. See GUELPHS AND GHIBELINES.

WAILING WALL is a high wall in Jerusalem. It is the remains of the western fortification of the Temple



Gidal, Black Star

A Pilgrim Pauses beside the Wailing Wall in Jerusalem to pray and to read the Torah, the sacred writings of the Hebrews.

mount. In its lower part it still has stones from Solomon's temple. It is forty yards long. Since the 700's, the Arabs have permitted the Jews to assemble here on the evenings before their Sabbath and their feast days. In their services at the Wailing Wall, the Jews recall their sacred traditions, and wail and pray. In 1928, the English police, urged by the Arabs, forcibly removed a paper curtain which had been hung as a partition to separate the men from the women. This disturbance of divine worship at this most sacred site of Judaism alarmed Jews everywhere. The incident greatly disturbed peace in Palestine and led to many riots and bloodshed between the Arabs and Jews. The issue was settled in 1931 by a decree which restricted the Jews' rights to use the wall, and prohibited the blowing of the Shophar there. See also JERUSALEM (illustration). L.C.M.

WAINWRIGHT, JONATHAN MAYHEW (1883-), is an American soldier. He commanded the American and Filipino forces on Bataan peninsula and Corregidor after General Douglas MacArthur was ordered to Australia in the early days of World War II. His courage and determination in the face of overwhelmingly superior forces made him an American hero.

Wainwright was born in Walla Walla, Wash., and was graduated from the United States Military Academy in 1906. He became a cavalry officer and served in the Philippines against the Moro rebels in 1909 and 1910. During World War I he was attached to the General Staff of the 82nd Division in France. In 1940 Wainwright went to the Philippines and in October was given command of the Philippine Division. After the American surrender in April, 1942, Wainwright was held a prisoner by the Japanese. He was released in time to witness the formal Japanese surrender at the end of the war, and to receive the surrender of General Tomoyuki Yamashita, commander of Japanese forces in the Philippines. On his return to the United States he was promoted to general and awarded the Medal of Honor by President Harry S. Truman. After the war he commanded the Fourth Army. F.S.M.

See also BATAAN PENINSULA; MACARTHUR, DOUGLAS.

WAIST. See BOATS AND BOATING (Boat Building).

WAIT was the name for a night guard which kept watch at city gates in medieval times. In the 1400's and 1500's, waits came to be paid musicians who were supported by towns and cities. In the 1700's the town waits who played and sang at various houses at Christmas were called the *Christmas Waits*.

WAITE, wayt, MORRISON REMICK (1816-1888), was Chief Justice of the United States Supreme Court from 1874 until his death. He was born at Lyme, Conn., and studied law at Yale University. In 1839 he was admitted to the bar in Ohio. In 1856 Waite helped to found the Republican party. In 1871 he was one of the American



Jonathan Wainwright, U.S. hero of World War II

delegates to the Geneva Tribunal which considered the Alabama claims. (See ALABAMA, THE). Three years later President Ulysses S. Grant named him to follow Salmon P. Chase as Chief Justice of the Supreme Court. He was its dominating figure in the period of Reconstruction following the Civil War, and he generally upheld the powers of the states, particularly when they regulated the activities of corporations. See also SUPREME COURT OF THE UNITED STATES. W.S.E.

WAKE is the name given to a watch kept over the dead before burial. The custom probably started among the Celts of early Britain. The Anglo-Saxons called the practice *lichwake*. This word comes from *lic*, which means *corpse*. The dead person was placed under a table, and liquor was placed on the table for the dead man's friends. After the Reformation the custom of wakes disappeared in England, but was still carried on in Ireland.

Today a death watch called a wake is kept in parts of Great Britain and the Americas. At present-day wakes, friends or relatives gather to keep watch over the corpse in his casket. Refreshments are sometimes served to the watchers. W.D.H.

WAKE FOREST COLLEGE is a coeducational school at Wake Forest, N.C., owned and supported by the Baptist Church. It teaches the liberal arts and has professional schools of law and medicine. Wake Forest College was founded in 1834, and has an average enrollment of about 1,000. D.B.B.

WAKE ISLAND. This coral reef in the Pacific Ocean is one of three islands, which together cover an area of about three square miles. The other two are Wilkes Island and Peale Island. The islands lie 2,300 miles west of Honolulu and 1,520 miles northeast of Guam. Wake was first discovered by the British in 1796. They named it Halcyon Island. Commander Charles Wilkes of the United States Exploring Expedition visited Wake Island in 1841, and the United States formally claimed the island in 1898. In 1935 the island became an important landing place for transpacific air lines.

In December, 1941, the Japanese captured the island, after being held off for fourteen days by a force of 400 United States Marines and about 1,000 civilians. The defense of Wake was one of the most heroic events of the war in the Pacific. E.E.Et.

WAKE-ROBIN. See TRILLIUM.

WAKULLA, *wah KUL ah*, **SPRINGS.** See FLORIDA (Springs; Other Interesting Places to Visit).

WALD, *wahld*, LILLIAN D. (1867-1940), was an American social worker who pioneered in public health service. She was born in Cincinnati, Ohio, and was graduated as a nurse from New York Hospital in 1901. She became interested in the poor living conditions of people on New York City's East Side, and went to work among them.



Brown Bros.
Lillian Wald, American social service worker

In 1893 she founded the Henry Street Settlement, which eventually grew to a large size and attracted world-wide interest. The settlement included a visiting nurse service and the first school nursing service. Lillian Wald also organized the Federal Children's Bureau. She was active in international peace movements. R.M.B.

WALDECK, THEODORE J. (1894-), is an American explorer and writer. He is known for his expeditions into East Africa, the Belgian Congo, Ethiopia, the Sudan, South Africa, and British Guiana. He was born in Brooklyn, N.Y., and was educated in Vienna. He was only eighteen years old when he started on his first expedition. In his book *On Safari* he wrote humorously of this experience. After World War I, he returned to Africa as a member of the Frobenius Expedition. His wife, JoBesse McElveen, wrote *Jungle Journey* and other books about their travels. B.F.

His Works include *Treks Across the Veldt; The White Panther; Lions on the Hunt; and Jamba the Elephant.*

WALDEMAR II, "THE VICTORIOUS" (1170-1241). See DENMARK (Early German Influence).

WALDENSES, *wahl DEN seez*, are members of a Christian sect which was founded in the Middle Ages by Peter Waldo, a wealthy merchant of Lyons, France. In 1176 he gave all his money to the poor and began a life of poverty and religious devotion. His preaching attracted many followers who took vows of poverty, chastity, and obedience. They were known as the "poor men of Lyons." Pope Alexander III forbade them to preach. They were persecuted severely, and Pope Lucius III excommunicated them, or banned them from the church, in 1184. But they still continued to grow in numbers. They believed that men should interpret the Bible in their own way. They also thought that religious works should be translated and preached in languages the people understood. Their ideas influenced John Wycliffe and John Huss, and through them helped to bring about the Reformation. Today, there are more than 13,000 Waldenses in various European countries, as well as a few in America. A.R.WE.

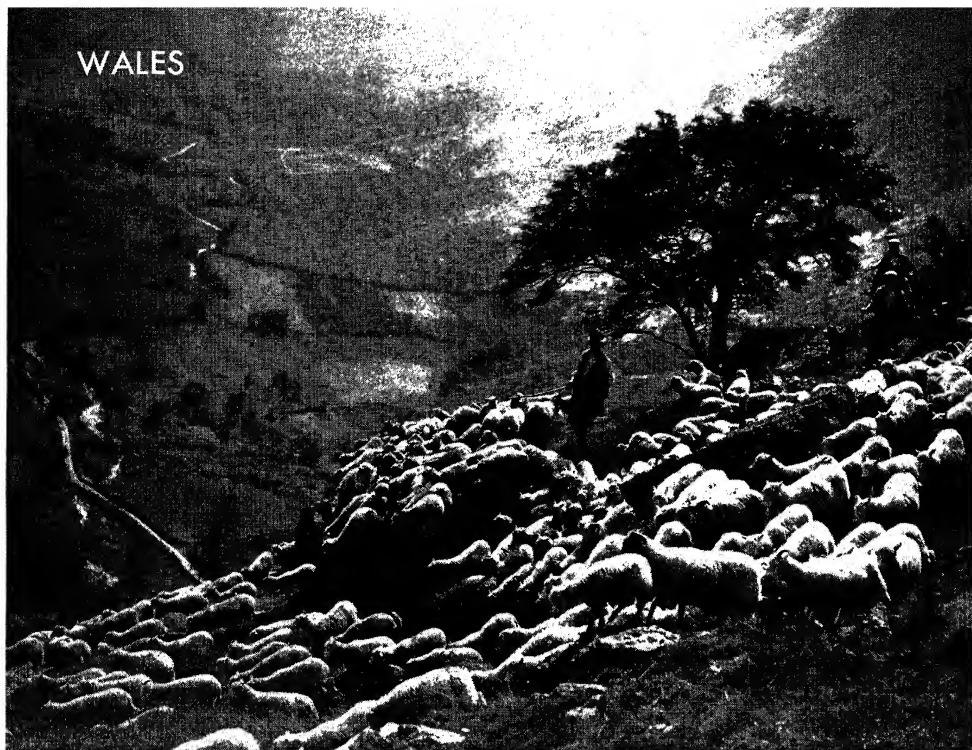
WALDO, PETER. See WALDENSES.

WALES, *waylz*, is a peninsula on the southwest coast of Great Britain. It is joined with England by geography and by government. But the Welsh people have their own language, literature, traditions, and have a great national pride. Wales is a land of rough mountains, deep valleys, and rushing streams. Its wild, picturesque scenery offers a good background for the legends and tales of Welsh folklore. The Welsh name for the country is *Cymru*, from the Welsh word *Cymry*, which means *fellow countrymen*. The Welsh call themselves *Cymry* in their own language, and sometimes refer to their country as *Gwalia*. In literature Wales is often called by its Latin name, *Cambria*.

The Land and Its Resources

Wales covers an area of 7,466 square miles. It is a little smaller than the state of New Jersey. An island called Anglesey lies just off the northwestern corner of Wales. This island is separated from the mainland by a narrow channel, named the Menai Strait. The Menai Suspension Bridge joins Anglesey with the mainland. This bridge was the first long iron suspension bridge

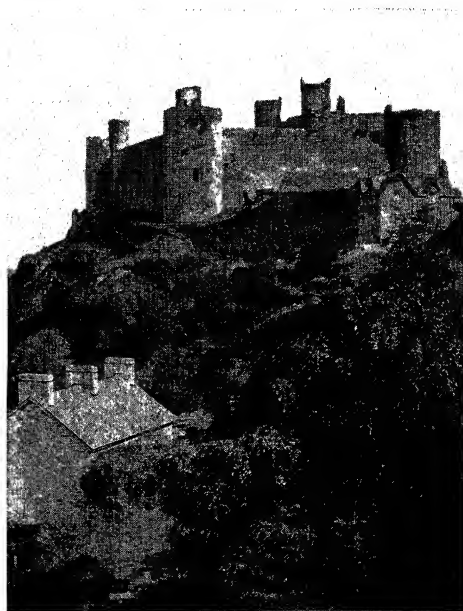
WALES



Welsh Shepherds Drive Their Flocks from the Hills. The steep hills and green valleys make Wales one of the loveliest parts of Great Britain. This scene is in Denbighshire, where they have been grazing, to the farms in the valley below.



Coal Miners Trudge to Work along the street of a bleak Welsh mining town in the Rhondda Valley area.



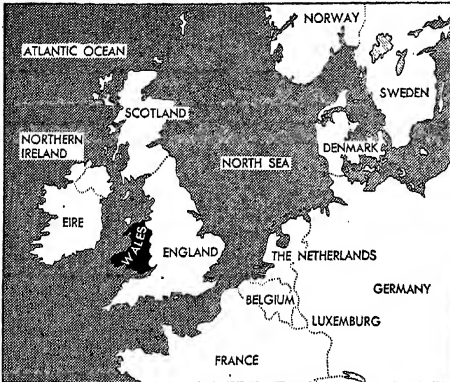
Grim Harlech Castle at Merioneth, built in the Middle Ages, is a reminder of Welsh-English warfare.

Photos: British Combine; Robert Capa, Pix; Ewing Galloway

ever built. For the boundaries of Wales, see GREAT BRITAIN (colored map).

Bare, rugged mountains rise in many parts of the country. Snowdon Peak (3,557 feet) in northwestern Wales is the highest point in either Wales or England. Deep lakes lie in many of the valleys of Wales. The coast has many good harbors.

The rivers are rapid and short. Most of them flow so swiftly that boats cannot use them for trade routes. The



Location Map of Wales

Severn and Wye rivers rise in the mountains of Wales and flow eastward into England. The rivers of Wales furnish enough water power for electric current.

Wales has no large forests. Wide upland pastures and moors, or grassy plains, cover much of the country. Only about one third of Wales can be used as farm land. The country's greatest natural resource is the coal which is found in south Wales. These deposits have been mined for more than 150 years and still have large reserves of hard coal and steam coal. A smaller coal field lies in northern Wales.

Climate. Wales lies about as far north as southern Labrador. But the warm winds from the Gulf Stream blow across Wales and make the climate mild. Rainfall is heavy throughout the country. It reaches an average of 120 inches a year around Snowdon.

The People and Their Work

The People. Wales has a population of 2,158,374. This is less than one third as large as the population of New York City. Wales has an average population density of about 290 persons per square mile. More than half of the people live in the county of Glamorgan, where the chief coal mines, industries, and ports are located. The remainder of Wales is rural.

Stone tools found in Wales show that many people lived in this region in the Neolithic or Late Stone Age. These people had dark hair and dark eyes. About a thousand years before Christ was born, Celts began to cross the English Channel from the European continent to Britain. These people were tall and fair. They used bronze tools. Under priests known as Druids, they worshiped nature spirits. The Celtic tribes moved into Wales as conquerors. They mingled with the native

people and gave them their language and religion. The Celtic physical type gradually gave way to that of the dark-haired Welsh, and almost disappeared in Wales.

In the Middle Ages, many Norman warriors and English and Flemish craftsmen settled in Wales. But most of the modern Welsh people are descended from the first known inhabitants of Wales. The Welsh usually have dark hair and eyes, like these early people. But their culture is that of the Celtic people who came into the country from continental Europe.

The Welsh pride themselves on being sturdy, generous, and freedom-loving. They have a special feeling for beauty in poetry and music. Many Welsh people have left Wales to live in England, various parts of the British Empire, and Patagonia in the Argentine. A large group of Welshmen settled in early Pennsylvania. They were especially invited by William Penn to come to Pennsylvania and settle in a part of the colony which was set aside and known as the Welsh Tract. Here they were allowed to have their own laws, speak their own language, and keep their own customs. Today there are many people of Welsh descent living in the United States. Common Welsh names include Jones, Williams, Davies or Davis, Evans, Edwards, Roberts, and Morgan.

Minerals and Manufactures. The chief industries of Wales are mining and manufacturing metal products. The rugged country makes mining difficult. But the coal deposits are near the sea, and the coal may be easily shipped. The steam coal from the Aberdare and Rhondda valleys is world famous. It was at one time widely used by the coal-burning navies of the world. The coal is anthracite, or hard coal, of high quality and almost smokeless. Most of the coal is exported through Cardiff, the chief coal port of the world.

There are large slate quarries in northern Wales. South Wales is the chief British center for refining copper, tin, zinc, and nickel. These ores are brought in through the port of Swansea. Wales also has important lead mines. Welsh factories produce tin plate, galvanized iron, and special metal alloys for use in Great Britain and for export. More and more aluminum has been manufactured since water power was first developed for electricity.

Agriculture. Cattle raising is the chief occupation of Welsh farmers. The cattle are sold to English farmers for fattening. Sheep, mostly of a small, hardy mountain breed, are also raised. The chief farm crops are oats and barley.

Cities and Towns. Cardiff, the chief city of Wales, is described under its own name in THE WORLD BOOK ENCYCLOPEDIA. Other important cities are described below.

Aberystwyth, *AB er IST* with (population 9,474), is the cultural and educational center of Wales. It is also a favorite Welsh summer resort. The city lies on Cardigan Bay. Aberystwyth is the home of one of the four colleges of the University of Wales, and of the National Library of Wales. This library has the finest collection of Welsh books and manuscripts in the world.

Caernarvon, *kahr NAHR vun* (population 8,469), lies on the northwestern coast of Wales, just across the Menai Strait from the island of Anglesey. Caernarvon is famous for its castle, which dates from the 1200's. A legend tells that the first Prince of Wales, who later became Edward

II of England, was born in this castle. Ancient town walls with high towers are still standing.

Llanelli, *lah NETH lih* (population 38,393), is a port on the southern coast. It lies at the mouth of the Burry River, and is an important export center for coal. Llanelli's location near the coal fields has made the city an important manufacturing and industrial center. A heavy cloud of smoke often hangs low over Llanelli, and the city is sometimes called the "Pittsburgh of Wales." Its factories produce tin, steel, and metal products.

Llanfairpwllgwyngyllgogerychwyrndrobwllllandysiliogogogoch. This village has the longest name appearing on any railroad station in Wales. The name means *Church of Saint Mary in a hollow of white hazel, near to a rapid whirlpool and to Saint Tysilio's Church, close by a red cave*. The post office uses a shortened form of the name, "Llanfair P.G." The village lies on the Anglesey shore, four miles from Bangor.

Merthyr Tydfil, *MUR ther TID fil* (population 67,200), is the center of the iron trade of south Wales. The city lies on the River Taff, in the heart of the coal district. The city became an early center for iron and steel manufacture because of near-by iron and limestone deposits. Bessemer steel was first rolled into rails at Merthyr Tydfil. The lack of high-quality iron ore has prevented the city's development as a great steel center.

The name of the city comes from two Welsh words. *Merthyr* is the Welsh word for *martyr*. *Tydfil* is the name of a Welsh saint who was martyred by the Saxons.

Rhondda, *HRON thah* (population 141,344), is a coal-mining center of south Wales. The city lies in a long, narrow valley formed by the Rhondda River, in the midst of a hilly region of great beauty.

Swansea, *SWAHN see* (population 165,500), is the second largest city in Wales. It lies forty-five miles west of Cardiff on Swansea Bay. The city was founded in the 1800's. It became important in the 1800's, after the development of the hard-coal trade and the smelting industry. The use of tin cans for preserving fruits and vegetables brought prosperity to the city. Swansea became the chief British center for the manufacture and shipping of tin plate. The city was called the "tin plate center" of the world. Other industries in Swansea include the refining of nickel, zinc, and petroleum. The city has modern docks which cover 281 acres.

Social and Cultural Achievements

Education. The public education system of Wales is part of that of England. (See ENGLAND [Education].) The University of Wales was founded in 1893. It has four colleges, located at Aberystwyth, Bangor, Cardiff, and Swansea.

Language and Literature. The Welsh language belongs to the group of Celtic languages which are still spoken in Brittany and Cornwall, and on the Isle of Man. It is somewhat like the Gaelic language of Eire and Scotland. The letters *j*, *k*, *g*, *x*, and *z*, do not appear in Welsh, and the letters *w* and *y* are sometimes used as vowels. The double *ll* (*ll*) which is so often seen in Welsh words is pronounced approximately as *thl*. The double *dd* (*dd*) is pronounced like *th* in *this*. Typical Welsh place names are *Rhuddlan*, *Puillheli*, and *Llandudno*.

Most of the Welsh people can speak English, for English has been the official language since the 1500's. Fewer than one tenth of the people speak only the Welsh language. But most persons speak both English and Welsh. Many books, magazines, and newspapers are published in Welsh.

The tradition of music and poetry in Wales goes back to the days of the ancient bards. (See BARD.) The na-

tional festival of the bards, the Eisteddfod, was revived in the 1800's. Welsh poets, composers, singers, and instrument players take part and compete for prizes. Music is extremely important in the lives of the Welsh people. Almost everyone sings and enjoys the strong, clear harmonies of Welsh songs.

The written literature of Wales goes back to the 1100's. The 1100's through the 1300's were the golden era of Welsh literature. The use of Welsh for poetry was revived in the 1700's and again in the 1800's. Many present-day writers of verse, short stories, and literary criticism write in Welsh and thus keep up the old poetic traditions.

Religion. The Welsh are a deeply religious people. Most of the people are members of a Protestant faith. The Church of England ceased to be the official state church of Wales in 1920.

Saint David is the patron saint of Wales. Saint David's Day, on the first of March, is the greatest national Welsh holiday.

History and Government

Government. Wales is joined with England in its government, and is represented in the British Parliament. See GREAT BRITAIN (Government).

History. The written history of Wales begins with the Roman invasion of Britain in A.D. 43. The Romans built roads and military camps. Roman civilization had little influence on the customs of the Britons, but it had tremendous influence on their language. The Roman legions left Britain in 407. Then the Angles and Saxons from Germany invaded and occupied the eastern, central, and southern parts of what is now Great Britain. But the Britons held out against the Angles and Saxons in regions along the western coast. The ruler who was later known in legends as King Arthur reigned at this time. Finally the Saxons divided the lands held by the Britons into three parts and conquered the northern and southern parts. But the Britons who found refuge in wild, mountainous Wales kept their independence for hundreds of years.

The long struggle against the Saxons formed the character of the Welsh people. They owed nothing to Saxon institutions. They would accept no Saxon rulers. Their only recognized rulers were the descendants of Cunedda, an early leader, whose authority went back to the Roman commanders of western Britain. The old bards, or song makers, who celebrated the deeds of Welsh heroes, continued to have a strong influence on the people of Wales. But they and their chieftains could unite only against the hated Saxons. They fought constantly among themselves.

William of Normandy, who conquered England in 1066, declared himself lord of Wales. He gave lands along the border of Wales to Norman barons, who built castles and established themselves there. Soon most of the central and southern parts of Wales were held by feudal lords who owed allegiance to the King of England. Sometimes the Welsh chiefs accepted English overlords in order to keep their lands. Sometimes they fought for their independence. In the 1200's Llewellyn ap Grif-fith brought much of the country under his control. In 1267 he was recognized as Prince of Wales in return for

doing homage to the English king. But in 1277 he resisted the claims of Edward I and was defeated in battle and killed.

In 1284 Edward I issued the Statute of Rhuddlan. This decree placed Wales directly under the English crown. The country was divided into counties under English sheriffs. Great fortified castles were built to use as bases in keeping the people subdued. Those at Caernarvon, Conway, and Harlech were among the most imposing fortresses of the Middle Ages. Tradition says that Edward promised the Welsh a prince, born in Wales, who could not speak English. In 1301 he gave the title *Prince of Wales* to his infant son, who was born at Caernarvon.

The proud Welsh revolted against the English many times. Owen Glendower drove out the hated English in 1402, but was killed in 1416. The position of Wales improved in the 1400's. A Welshman, Owen Tudor, married a princess of the English royal house. His son, Henry Tudor, claimed and won the English throne in 1485. The Welsh people slowly became reconciled to union with England. In 1536 the Act of Union was passed. This law joined the countries under the same system of laws and government, and provided for Welsh representatives in the English Parliament.

After 1536 the political history of Wales became one with that of England, and the English language came to be widely used. But the Welsh kept a strong patriotic love for their own land. Certain Welsh nationalists demanded dominion status for Wales, although most Welshmen did not want to be separated from England.

For many years, Welsh political union with England and loyalty to the British crown have remained unquestioned. Welsh regiments have fought in all Britain's wars. The Welsh members of Parliament, chiefly Liberal and Labor in their politics, have taken an important part in making the laws of Great Britain. A Welsh Liberal, David Lloyd George, became Prime Minister in 1916 and led Britain through World War I to victory. In World War II, the Welsh again did their part, both on the battlefield and in war production. German bombing raids in 1940 and 1941 destroyed large parts of Cardiff and Swansea, but the cities were rebuilt after the war ended.

F.H.H.

Related Subjects. The reader is also referred to:

BIOGRAPHY

Harris, Robert	Stanley, Henry
Lloyd George, David	Morton, Sir
Owen, Robert, and	Templeton, Alec
Robert Dale	

CHIEF PRODUCTS

Barley	Coal	Sheep
Cattle	Oats	

PHYSICAL FEATURES

Bristol Channel	Severn River
Irish Sea	Snowdon
Saint George's Channel	

UNCLASSIFIED

Dress (Great Britain; color plate, Europe)	Flower
Flag (color plate, Flags of British Commonwealth of Nations)	(National Flowers)
	Prince of Wales

Questions

What American state is about the size of Wales?
 What is the greatest natural resource of Wales?
 Why is Wales warmer than other places equally far north?
 Where do about half of the people of Wales live?
 How do you account for this?
 Of what qualities are the Welsh people very proud?
 What are the chief manufactured goods of the country?
 What legend is connected with Caernarvon castle?

WALES, PRINCE OF. See PRINCE OF WALES.

WALKER, AMASA, and **FRANCIS AMASA,** were two American economists, father and son.

Amasa Walker (1799-1875) was born at Woodstock, Conn. He went into business, but retired to study and engage in public science. He was a delegate to the first international peace conference at London. Walker held several state positions in Massachusetts, including that of secretary of state. His economic theories were important, not for their originality, but for their practical value in real problems. *The Science of Wealth*, Walker's main work, was popular for many years.

Francis Amasa Walker (1840-1897), son of Amasa, was born in Boston, and was known both as a brigadier general in the Union Army and an original thinker in economics. He served as head of the Bureau of Statistics in the United States Treasury and later directed the ninth census. Walker taught political economy for several years in the Sheffield Scientific School at Yale University, and later became president of the Massachusetts Institute of Technology. Walker's books include *The Wages Question*; *Money*; *Political Economy*; and *International Bimetallism*.

H.U.F.

WALKER, JOHN (1781?-1859). See MATCH (History).

WALKER, MARY EDWARDS (1832-1919), was an American physician and pioneer in women's rights. She was born in Oswego, N.Y., and was graduated from Syracuse Medical College. After practicing medicine, she taught school in New York City. Meanwhile, she championed reform of women's clothing, and began to wear men's clothing herself. She was awarded a Congressional Medal for her services as a nurse with the Union Army in the War between the States, and was commissioned assistant surgeon. In 1865 she resumed her medical practice in Washington, D.C., and continued her efforts for woman suffrage. In 1897 she founded a colony for women called "Adamless Eden."

R.M.B.

WALKER, THOMAS BARLOW. See MINNESOTA (Famous Minnesotans).

WALKER, WILLIAM (1824-1860), was an American filibuster, or military adventurer. He tried to make himself president of several Central American republics. Walker was born in Nashville, Tenn., and was educated at the universities of Nashville and Pennsylvania. In 1850 he went to California to hunt for gold. Three years later he assembled a regiment of soldiers and tried to conquer the Mexican state of Sonora. His attempt failed and the American authorities tried him for violating neutrality laws. He was freed and the following year he led a successful revolution in Nicaragua. He ruled there as president for almost a year, but was finally forced to leave. A few years later he tried to gain control of Honduras and was executed by the Honduras government. See also FILIBUSTER.

M.V.C.

WALKER ACT OF 1846. This bill was drawn up by Secretary of the Treasury Robert J. Walker. It was one

of the early United States protective tariff measures. The bill fixed very moderate import duties.

WALKIE TALKIE is the name given to a small, portable, two-way radio used by the American Armed forces during World War II. It weighs about thirty pounds, and is carried by one man, who straps it on his back. A collapsible antenna transmits and receives the messages. A smaller two-way radio growing out of the walkie talkie, and called the handie talkie, weighs only about five and three-quarters pounds. It was used by paratroops and infantry.

The walkie talkie has small, light, dry-cell batteries, and little vacuum tubes. Its receivers contain very small resistors and capacitors. The latest models are of the FM, or frequency modulation, type. The range of the walkie talkie is only a few miles, and soldiers in front lines could often talk with their company commanders without being heard by more distant enemy radios. The walkie talkie was also used by ships in convoy. After World War II, it found many uses in short-wave communication.

F.M.R.

WALKING. See **HEALTH** (Work and Play; Living Habits); **HOBBY** (Books about Hobbies [Hiking and Walking]); **POSTURE**.

WALKING FERN. See **FERN** (Classification).

WALKING LEAF. See **LEAF INSECT**.

WALKING STICK. The walking stick is an insect which looks like a twig. The strange appearance of this

insect protects it against its enemies. There are about a dozen different kinds of these twig, or stick, insects, as they are often called in the United States. The common walking stick of the eastern states has a very slender body which is two or three inches long. Its legs are long and awkward. Unlike most insects it has no wings. The walking stick varies in color. Sometimes it is brown and sometimes green. This makes it hard to see on either lifeless brown twigs or fresh green ones. The walking stick is a greedy eater of leaves. Sometimes it harms walnut, oak, locust, hickory, and other trees. Usually the female drops the eggs on the ground and pays no more attention to them, leaving the young to shift for themselves when the eggs hatch. As a result, but few walking sticks survive out of all that hatch. See also **LEAF INSECT**.

C.D.D.

Classification. Walking sticks belong to the family *Phasmidae* in the order *Orthoptera*. They are related to the leaf insect of the East Indies. Some authorities put walking sticks in a special order, the *Phasmida*.

WALL. See **CARPENTRY** (Walls); **CASTLE**.

WALLABY. See **KANGAROO**.

WALLACE, ALFRED RUSSEL (1823-1913), was a British naturalist and philosopher. He is best known for having worked out by himself a theory of evolution which was the same as Charles Darwin's. Both scientists published their discoveries at the same time in 1858. Wallace received many honors but Darwin finally became generally known as the founder of the theory of evolution through natural selection.

Wallace was born at Usk, in Monmouthshire. He received little education and at fourteen became a surveyor. For a short time afterward he taught in the Collegiate School at Leicester, and in 1848 he and a companion went on a trip to South America. Wallace explored the Amazon River and, later, the Malay Archipelago, and investigated the animal and insect life in these regions. His studies made him a firm believer in evolution and he developed this theory in the essay *On the Tendency of Varieties to Depart Indefinitely from the Original Type*. He spent his later years in botanical research in England, Switzerland, and America.

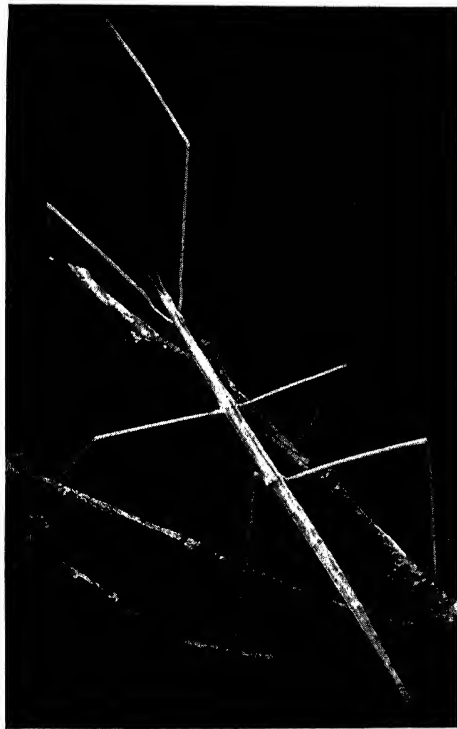
See also **DARWIN, CHARLES ROBERT**; **WALLACE'S LINE**.

WALLACE, EDGAR (1875-1932), was an English novelist, journalist, and playwright. He was born and educated in London. During the Boer War, he was a Reuters war correspondent in South Africa. Later he served on newspaper staffs in London. Wallace gave up newspaper work to spend all his time writing fiction, particularly mystery stories. He died in Hollywood, Calif., where he was writing for motion pictures.

L.J.
His Works include the novels *The India Rubber Men*, *Smilgy*, *People of the River*, and *White Face*; and the plays *The Ringer*, *The Terror*, and *On the Spot*.

WALLACE, HENRY AGARD (1888-), is an American political leader. From 1941 to 1945 he served as Vice-President of the United States under President Franklin D. Roosevelt.

Wallace was born in Adair County, Iowa, the son of a well-known farmer. Young Wallace studied agriculture at Iowa State College. After he left college in 1910, he worked under his father on *Wallace's Farmer*, an agricultural magazine that his grandfather had founded.



Lee Passmore

The Walking Stick looks so much like a tree twig that it easily escapes the notice of its enemies.

Wallace conducted several experiments in crossbreeding strains of corn to produce a high-yielding seed corn, and became known as one of the foremost plant experts in the country. In 1921 his father, Henry Cantwell Wallace, became Secretary of Agriculture, and young Wallace took his place as editor of *Wallace's Farmer*.

In 1933 Roosevelt named Wallace Secretary of Agriculture. In this position Wallace became known as an advocate of planned economy. He did the pioneer work on the Agricultural Adjustment Act. Wallace was opposed by many prominent party leaders. After his term as Vice-President ended, they tried to keep him from holding other public offices. His appointment in 1945 as Secretary of Commerce was confirmed by the Senate only after a bitter struggle.

Late in 1946, while the Paris Peace Conference was still in session, Wallace made a speech in New York City which was interpreted as criticism of the foreign policy of the United States toward the Soviet Union. In the bitter controversy that followed the speech, Wallace resigned at the request of President Truman. He then served as editor of *The New Republic* until late in 1947, when he resigned to lead a third-party movement. In 1948 his Independent Progressive party nominated him for President of the United States. E.E.R.O.

See also NEW DEAL.

WALLACE, HENRY CANTWELL (1866-1924). See IOWA (National Politics).

WALLACE, LEWIS (1827-1905), commonly known as Lew Wallace, was an American soldier, politician, and novelist. He is best-known as the author of *Ben Hur*,

one of the most popular books of modern times. This work was subtitled *A Tale of the Christ*, and was read even in sections of America where all novels had previously been banned as loose and immoral.

Wallace was born in Brookville, Ind. He was the son of a politician who later became governor of Indiana. Young Wallace had little liking for school. When the boy was sixteen his father gave up the difficult task of keeping him in school and allowed him to work in

the county clerk's office and later as a reporter. He later studied law under his father, but before he had finished his studies, he left to volunteer as a lieutenant in the Mexican War.

After the war he practiced law in Crawfordsville,

Ind., and entered politics. When the War between the States broke out, he became adjutant general of Indiana. Soon afterward he became colonel of the Eleventh Indiana Infantry and later major general. In 1864 he saved Washington, D.C., from threatened capture by holding the forces of General Jubal Early at the Monocacy River. After the war Wallace returned to Crawfordsville and from 1878 to 1881 he served as governor of the territory of New Mexico. During this time he wrote *Ben Hur*, which he published in 1880. From 1881 to 1885 he served as Minister to Turkey. L.J.

See also STATUARY HALL.

His Works include *The Fair God*; *The Prince of India*; and *Lew Wallace, An Autobiography*.

WALLACE, WILLIAM, SIR (1272?-1305), was a Scottish patriot who led a revolt against King Edward I of England. The story of his life has stirred the national pride of Scots for more than six hundred years.

In 1296 King Edward drove out the king of Scotland and stationed English soldiers in Scotland. Wallace was then living at Dundee, and was known for his strength and courage. One day he quarreled with some English soldiers near his home. They called him a "wretched Scotchman," and Wallace attacked them. He killed one of the soldiers and fled into the Highlands. There he became the leader of a band of Scottish patriots who raided the English outposts. Wallace was joined by Scottish nobles who hated English rule and soon he was in command of a powerful army.

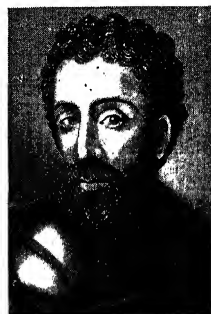
The English raised an army and advanced against Wallace. He defeated them in the battle of Stirling Bridge. King Edward hastened home from France and led a great army against the rebels. His heavily armored soldiers defeated the Scottish clansmen at Falkirk. Wallace escaped and carried on the fight in the mountains. He became known as the "guardian of Scotland." For seven years he lived in his mountain strongholds, with a price on his head. He was finally captured through treachery. Wallace had never sworn allegiance to England, but he was tried and executed for treason. A.M.

See also EDWARD (I, England).

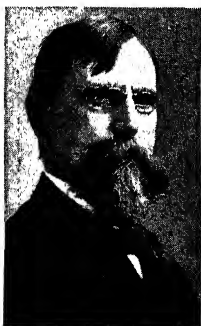
WALLACE'S LINE is an imaginary line in the southwestern Pacific which divides the animal life of the Australian region from that of the Asiatic, or Oriental, region. The line begins at the Philippines and extends west, separating Celebes from Borneo and Bali from Lombok. The line was named for Alfred Russel Wallace, an English naturalist. His researches convinced him that no two species are identical if they develop under different geographical and climatic conditions, even though they may be descended from a common ancestor. The animals of the southwest Pacific are supposedly different on the two sides of the line. See also WALLACE, ALFRED RUSSEL. G.W.Bz.



Brown Bros.
Henry A. Wallace, one of the leaders of the New Deal



Brown Bros.
Sir William Wallace was a Scottish national hero.



Brown Bros.
Lew Wallace helped make novels popular in America.

WALLAROO, *WAHL* ah ROO. See KANGAROO.

WALLA WALLA, Wash. (population 18,109), is the trading and shipping center of the fertile Walla Walla Valley. This region has one of the longest growing seasons in the northwestern United States. Walla Walla is the Indian word for *place of many waters*. The Indians gave this name to the region because it has so many streams. One out of every five cans of peas on grocers' shelves in the United States comes from the pea canneries in and near Walla Walla. Other products which are processed in the city include wheat, fruits and vegetables, beef cattle, and dairy products. Walla Walla is the home of Whitman College and Walla Walla College. The city was founded as a military post in 1855. Walla Walla is the seat of government of Walla Walla County. O.W.F.

WALLA WALLA COLLEGE is a coeducational school of liberal arts at College Place, Wash. It is controlled by the Seventh Day Adventist Church. It offers B.A. and B.S. degrees, and the bachelor's degree in theology, elementary education, nursing education, and manual arts. Students are required to work at least eight hours a week. Out-of-town students are required to live in dormitories. The school was founded in 1892. The average enrollment is about 600.

WALLBOARD. Many kinds of board made of fibers of wood, cane, and other fibrous materials are used to cover walls and ceilings. Wallboard gives protection against fire and weather, and insulation against heat and cold. It absorbs sound and serves as a decoration. Wallboard is made in sheets one-tenth inch to one inch thick, depending on the kind of wallboard and the use for which it is intended. It is made in sections as wide as four feet and as long as twelve feet.

Asbestos-cement board is made from a mixture of asbestos, a fibrous mineral, and Portland cement. Water is added so that the chemical reactions necessary for the setting and hardening of the cement can take place. The asbestos and cement mixture is molded under great pressure into hard-surfaced sheets. The exposed surface is smooth and is usually colored like cement, but wallboard is also made with color decorations. Sometimes it is scored like tile or given a marblelike finish.

Fiberboard is made from masses of cane or wood fiber pressed into sheets. The fibers may be loosely compressed, leaving air spaces for good heat-insulating and sound-absorbing properties. The surface of fiberboard is usually fibrous, but some is veneered with paper-thin sheets of mahogany and other woods. Fiberboard is used for interior surfaces and also for outside wall sheathing which is to be covered with wood siding or brick veneer. *Celotex* is the trade name of a well-known fiberboard made of cane fiber.

Hard board is known by the names *pressedwood*; *prest-wood*, and *Masonite*. These boards are made by heating specially treated masses of wood fibers and placing them under great pressure to form a dense, hard board. *Tempered board* is made by further treatment of hard board with liquids and heat.

Plasterboard is made of plaster cores of gypsum molded between heavy paper surfaces. W.C.H.

WALLENSTEIN, *WAHL* en stine, **ALBRECHT EUSEBIUS WENZEL VON** (1583-1634), was a German general and

statesman who tried to unify Germany. He was one of the greatest figures of the Thirty Years' War. He was the inspiration for Friedrich Schiller's tragedy *Wallenstein*.

Wallenstein was born in Herrmannitz, Bohemia, of noble parents. He was educated at a Jesuit college at Olmütz and at the universities of Altdorf, Padua, and Bologna. After a tour of Europe and service with the Hungarian army, he returned to Bohemia and married a wealthy widow. In 1617 he offered to serve the Emperor Ferdinand and was appointed a colonel in the imperial army.

When the Thirty Years' War broke out the next year, the Bohemian revolutionary party asked for his services, but he served instead with the emperor. (See also **THIRTY YEARS' WAR**.) The emperor rewarded him and permitted him to form and rule the duchy of Friedland. In 1625 the king of Denmark entered the war against the emperor, and Wallenstein formed an army of 20,000 men with which he won numerous victories in Hungary. In 1627 he marched into Silesia and later defeated the Danes. In 1628 he failed to take Stralsund. Two years later the Catholic League, which opposed Wallenstein's idea of unifying Germany and allowing religious freedom, persuaded the emperor to dismiss him. But in 1632 the emperor gave him supreme command and promised to carry out Wallenstein's religious policies. But he broke his promise and Wallenstein planned to desert him. The emperor learned of his alliance with the enemy and had him killed. R.H.Lu.

See also GUSTAVUS (II, Sweden).

WALLEYED HERRING. See ALFWIFE.

WALLEYED PIKE. See FISH (color plate, Fresh Water Fishes); PERCH.

WALLFLOWER. This fragrant garden and house plant first grew in southern Europe. It is named from its habit of growing on walls, over ruins, and along stony cliffs. It is sometimes called the gillyflower. The wallflower is a shrubby plant and belongs to the mustard family. It bears long clusters of single or double golden, maroon, or purple flowers. See also FLOWER (color plate, Mountain Flowers). A.C.Ho.

Classification. The wallflower belongs to the family *Cruciferae*. Its botanical name is *Cheiranthus cheiri*.

WALL OF CHINA. See GREAT WALL OF CHINA.

WALLOON, *wah* LOON. The Walloons are a Celtic people who live in the provinces of southern Belgium. They are descendants of the ancient Belgae of Gaul who adopted the Roman ways of life. Today the customs and language of the Walloons are much like those of the French. See also BELGIUM (The People). W.M.Kr.

WALLPAPER. The Chinese were the first people to use paper. They were also the first to use it as a decorative wall covering. Tapestry and velvet hangings were used for wall decoration in Europe until the 1500's. The first strips of wallpaper were imitations of these hangings. They were used by the poor who could not afford silk or wool tapestry. Later, wealthy people also used wallpaper instead of tapestries. The first wallpaper was painted. Later, block printing was introduced into wallpaper design.

Another form of decoration was *flock printing*. In flock printing, the design was outlined with glue. Then

finely chopped bits of silk and wool were sprinkled on. A damasklike design was left when the glue dried and the loose bits were brushed off.

While fine wallpapers are still often block printed, most commercial wallpaper is now printed on roller presses. The first blocks for the printing of wallpaper could produce only small sheets. These had to be pasted together to make a long roll. The cylindrical roller presses of today make it possible to print wallpaper in practically unending rolls. The pattern is applied and printed in much the same way that a modern newspaper is printed.

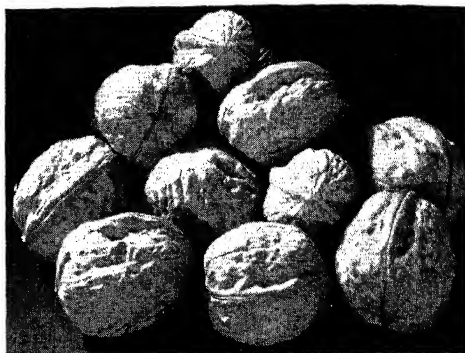
Preparing wooden or rubber rollers for the presses is a job requiring much skill in the work of block cutting. Some rollers are made of aluminum, and the pattern is etched with acid. A staff of designers prepares the patterns. Each pattern must then be traced on separate rollers, because one roller is needed for each color that is going to appear in the pattern. From the presses, the paper goes through a drying machine. Finally, it is cut and rolled by machinery and is ready for sale. E.B.

See also INTERIOR DECORATION.

WALL STREET. See CHICAGO (Loop); NEW YORK CITY.

WALNUT is a forest tree which bears one of the most valuable of nuts. Several kinds of walnut trees grow in the United States. Two of these are native to the East, the *black walnut*, and the *white walnut*, also called the *butternut*. The third, the *English* or *Persian walnut*, was brought from southern Europe, and is grown commercially in California and Oregon. The lumber of the black and English walnuts provides valuable furniture wood.

English Walnut. The English walnut is the most important of the walnut trees. It bears the most valuable walnut of commerce. The trees have gray bark and usually are smaller than the American walnuts. They have large leaflets, softer wood, and a mild-flavored nut. The



Ewing Galloway

The English Walnut Has a Thin Shell and Fine Flavor

English walnut has been grown commercially in Europe since Roman times.

There are two kinds of English walnuts. These are called the *Santa Barbara* group and the *French* group. The *Santa Barbaras* are less able to resist heat and cold and require a longer growing season than the *French* group. *Santa Barbaras* grow only along the coastal plains and the near-by valleys of southern California. The *French* group will resist extremes of both heat and cold. It is grown from central California to Oregon.

Neither kind of English walnuts grows well in the southern states. These trees need deep, well-drained, fertile soil to give their best yield and quality. English walnut trees are also sensitive to alkali salts and must have pure irrigation water.

The English walnut produces small flowers, which may be cross-pollinated or self-pollinated.

The nut is thin-shelled, sweet, and has much food value. It contains both fats and proteins.



The Ball-shaped Hull of the Black Walnut is thick and pulpy. The shell of the nut is deeply grooved and extremely hard.



L. W. Brownell; U.S. Forest Service

Trunk and Leaves of the Black Walnut. The bark is ordinarily dark brown, and two to three inches thick on old trees.

Permanent trees are planted at least sixty feet apart. They need no special care, except irrigation in some areas. When the nuts are ripe, they are shaken down, hulled, and dried. Then they are sent to the packing houses where they are sorted, sized, bleached, blended, branded, and sacked for shipment. The poorer grades are shelled and used to make walnut oil and shell flour. One single co-operative organization markets nearly all the English walnut crop.

The United States is the principal producer of walnuts, followed by France, Italy, China, and Rumania. Of a yearly production of 55,000 tons in the U.S., California produces 50,000. California has about 135,000 acres of walnuts under cultivation. The industry is centered in Los Angeles.

Black Walnut is a hardy Temperate Zone forest tree. It is grown mainly for lumber, although the nuts are also harvested and sold. These nuts have a distinctive and rich flavor, but their shell is very hard and thick. They are usually shelled before they are sold. A few thin-shelled varieties have also been developed.

Black walnut wood is dark purplish brown, with a fine grain and luster. It is valuable for interior finishing, furniture, and gunstocks. This wood is becoming rare, and its value is increasing.

W.M.HAR.

See also BUTTERNUT.

Classification. The walnut is in the *Juglandaceae* family. The English walnut is *Juglans regia*, the black is *J. nigra*, and the butternut is *J. cinerea*. The two native California species are *J. hindsii* and *J. californica*.

WALNUT CANYON. See NATIONAL MONUMENT.

WALPOLE, HUGH SEYMOUR (1884-1941), was an English novelist. He was a master of vivid description, and had a clear eye for the social backgrounds of the characters he created. Walpole was born in Auckland, New Zealand. His father later became bishop of Edinburgh, Scotland. Walpole was educated at King's School, Canterbury, and at Cambridge University. His first novel, *The Wooden Horse*, appeared in 1909. L.J.

His Works include *Jeremy*; *The Captives*; *The Cathedral*; *Blind Man's House*; *The Killer* and *the Slain*; and the non-fiction work *These Diversions: Reading*.

WALPOLE, ROBERT, SIR, EARL OF ORFORD, and **WALPOLE, HORACE, EARL OF ORFORD**, were famous Englishmen of the 1700's, father and son. The elder was a distinguished statesman. The son was a noted writer.

Sir Robert Walpole (1676-1745) was the first Englishman to be given the title of Prime Minister. He was born at Houghton, Norfolk, and was educated at Eton College and at King's College, Cambridge University.

At first Walpole planned to become a clergyman. But he ran for Parliament in 1701 and was elected from his family's borough of Castle Rising. He soon became a power in the Whig party. In 1708 Walpole was appointed Secretary for War. Two years later the Whigs lost power and he went out of office. Walpole became a leading member of the opposition. In 1712 his political enemies unjustly accused him of corruption and he was expelled from the House and thrown into the Tower of London. But his imprisonment made him a national figure and increased his popularity.

In 1714 George I was brought over from Germany to become King of Great Britain. Walpole, who was now free again, supported the new royal family, and his fortunes quickly improved. He became a member of the

Privy Council, Paymaster-General of the forces, and Chancellor of the Exchequer. In 1717 the ministry changed and Walpole went out of power for a time. After the collapse of the South Sea Company, a speculation scheme which ruined many fortunes, he was called back into the government. As Chancellor of the Exchequer and First Lord of the Treasury he prevented a financial panic and put the country's finances in order.

His government was so successful that he remained in power for twenty-one years. From 1721 to 1742 he was the real ruler of England. His years of power were marked by prosperity at home and peace with foreign nations, except for a war with Spain at the close of his ministry. Walpole handled England's foreign affairs skillfully and avoided war. He was the first to use the famous phrase "balance of power."

George I died in 1727. Walpole's enemies hoped that he would be dismissed by the new king. But George II kept Walpole in power as his father had. By 1737 Walpole

had made many powerful enemies and his ministry was often in difficulty. After 1737 there were several times when a less determined man would have been forced to resign. In 1739 war was declared on Spain, against the advice of Walpole. In February, 1742, he was raised to the peerage as the Earl of Orford. A few days later he resigned his office. But the king continued to ask his advice on important questions.

In his old age Walpole was again accused of bribery. The charges were false as far as he himself was concerned. But he frankly admitted that his government had bribed members of Parliament, and openly declared that it was often necessary to do so. But he himself left his office poorer than when he entered it. His administration made the position of the Hanover kings secure and strengthened the Parliamentary system.

Horace Walpole (1717-1797) was the youngest son of Sir Robert Walpole. He was born in London and was educated at Eton College and Cambridge University. He served in Parliament from 1741 to 1768, but never had much interest in politics.

Horace Walpole became famous as a writer. He is best known for his *Letters*, which were written about the society of his time. They are entertaining; but Walpole did not always write the truth, and the historic value of his works is not great.

Walpole set up a private printing press at Strawberry Hill, his home in Twickenham. There he made a hobby of printing editions of his own and other books. A.M.

See also **GEORGE (I, England)**.

His Works include *The Castle of Otranto*, a popular mystery story and *The Mysterious Mother*, a tragedy.

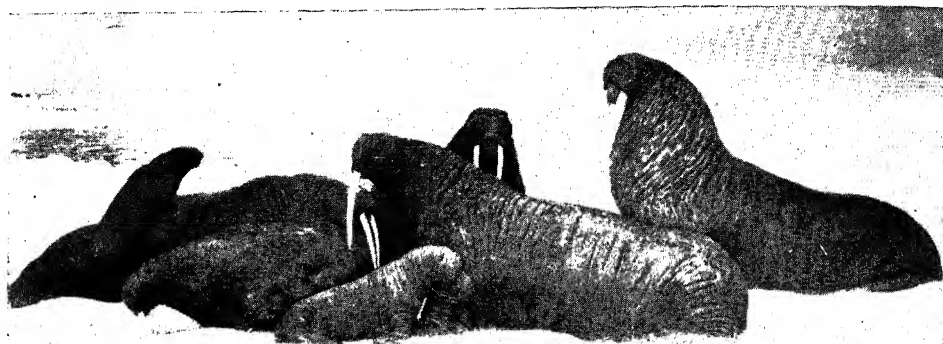
WALPURGIS NIGHT is the German name for the eve of May Day, when the feast of Walpurgis, a German saint, is celebrated. According to legend, the witches gather on this night and celebrate their Sabbath on the gloomy, mist-covered Brocken, highest peak in the Harz Mountains.

WALRUS. The walrus is an animal which lives in the region toward the North Pole. It prefers to live on



Brown Bros.

Sir Robert Walpole was one of the British Empire's greatest leaders.



Chicago Natural History Museum

A Group of Walrus on an Ice Floe in the Polar Sea. The Larger Animals May Weigh More than a Ton Each

drifting pack ice, but it also comes ashore on islands and shores. Its name comes from a Scandinavian word which means *whale horse*. The walrus looks a good deal like the seal. The walrus, however, has long tusks which project downward from the upper jaw, sometimes as far as thirty inches. A seal has no tusks. A full-grown walrus is about ten feet long. An old male may weigh 2,000 to 3,000 pounds.

The walrus uses its tusks to dig out food from the ocean bottom. It eats clamlike animals, shrimps, and plants which grow on the ocean bed. The tusks are also useful as weapons against polar bears, which are the walrus's enemies. The walrus has a mustache of thick bristles on its upper lip. The bristles are used to strain out the food.

Walrus live together in herds. In the water a swimming walrus can move fast. When it is on land or on the ice, however, its movements are slow and clumsy. The walrus often makes a bellowing sound which can be heard for long distances. It is not harmful if it is not bothered, but if one member of the herd is attacked, all the others will come to defend it.

There are not as many walrus today as there once were. The Eskimo hunt them for food. Their oil and their tusks are also valuable.

R.KEL.

See also **ANIMAL** (color plate, Arctic Lands and Seas).

Classification. The walrus is grouped with the seal tribe in the suborder *Pinnipedia*. The two known species of walrus make up the family *Odobenidae*. The Atlantic species is *Odobenus rosmarus*; the Pacific *O. obesus*.

WALSH, THOMAS JAMES (1859-1933), was an American politician. He served as senator from Montana from 1913 to 1933. He was born at Two Rivers, Wis., and was educated at the University of Wisconsin. Walsh began his career as a lawyer and gained fame by his prosecution of the Teapot Dome oil scandal. E.E.R.O.

See also **COOLIDGE, CALVIN** (Teapot Dome Investigation).

WALTER, VOL ter, BRUNO (1876-), is one of the world's leading conductors. Walter was born in Berlin. His real name was Bruno Walter Schlesinger. He began his career as a child prodigy pianist in Berlin, and later conducted orchestras throughout Europe for many

years. In 1935 the Nazis forced him to leave Germany. Three years later he was driven from Austria, where he had been conductor of the Vienna State Opera and of the Salzburg Festivals. He then became a French citizen. But after the fall of France, he settled in the United States and became an American citizen. In 1947 he became conductor of the New York Philharmonic Symphony Orchestra.

G.B.

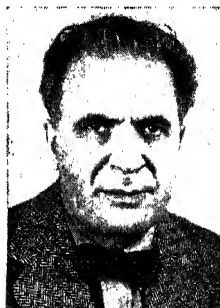
WALTER REED GENERAL HOSPITAL. See **REED, WALTER, GENERAL HOSPITAL**.

WALTHAM, Mass. (population 40,020), is a manufacturing center near the headwaters of the Charles River, nine miles west of Boston. It is the home of the world's largest watch factory, the Waltham Watch Company. The first machine-made watches in the United States were produced here when the factory was established in 1854. Other products made in Waltham include cotton and knit goods, furniture, plumbing supplies, paper, silk goods, shoes, and electrical products. The Boston Manufacturing Company, established here in 1813, was the first company in the United States to make finished cloth from raw cotton. Waltham was established as a town in 1738.

W.F.D.

WALTHER, VAHL ter, LEAGUE. See **LUTHER LEAGUE**.
WALTHER VON DER VOGELWEIDE (1170?-1230?). See **MINNESINGER**.

WALTON, WAWL tun, IZAAK (1593-1683), was an English author who is known as "the Father of Angling." His chief work, *The Compleat Angler, or the Contemplative Man's Recreation*, is the most popular book on fishing ever written. The book is written in the form of a dialogue between an angler, or fisherman, a hunter, and a falconer, who each discusses his favorite sport. The book tells little of the art of fishing, but it is read for its gentle humor and descriptions of outdoor life.



Gottlieb, Pix

Bruno Walter, noted symphonic conductor

Walton was born in Stafford. At about the age of eighteen he went to London and became apprenticed to an ironmonger. Later he joined the Ironmonger's Company and became a successful businessman. In 1644 he retired and spent most of his time visiting his clergyman friends.

G.E.B.

See also ANGLING; FISHING; IZAAK WALTON LEAGUE OF AMERICA.

His Works include several poems and biographies of John Donne and Richard Hooker.

WALTZ. See DANCING (Development of the Dance [The 1700's]).

WALTZING MATILDA. See AUSTRALIA (National Symbols and Events).

WALVIS, WAWL *vis*, **BAY.** See UNION OF SOUTH AFRICA (Location, Size, and Surface Features).

WAMPANOAG, WAHM *pah NO ag*, an Indian tribe. See MASSASOIT.

WAMPUM is a name for white, purple, or black beads made from shells. The Indians in the eastern part of North America used wampum as money. It was also used as a decoration, and was worn on holidays. The wampum was made into belts or woven into clothing to stand for wealth or power.

The colors of the beads stood for certain things. The Indians believed that white stood for health, peace, and riches. Purple and black meant sorrow or sympathy with another's sorrow. The dark beads were often more valuable than the white.

The beads were made from the insides of shells and were about a quarter of an inch long, and half that wide. They were usually strung on a thin piece or strip of the skin of an animal. The Indians often made five twelve-inch strings of beads in a day.

Wampum was an important means of trade between the Indians and the colonists in the early days of America. Most of the things bought or sold were exchanged on the basis of how much they were worth in wampum. Laws were passed to set up a standard of value for the strings of beads. Six beads were worth a penny in some places. A six-foot string of beads was worth from five to ten shillings, or about one or two dollars.

Belts of wampum were often exchanged between



Brown Bros.

Izaak Walton, author of *The Compleat Angler*

Indians and colonists as a sign of good faith when treaties and agreements were made. In 1661 the use of wampum as money was stopped in many places because so much false wampum was in circulation. But strings of beads were considered valuable for exchange purposes until the 1700's.

Shells have often been used as money in many lands and among many different races, especially in Asia, Polynesia, and Australia.

J.Cop.

See also CLAM.

WANAMAKER, JOHN (1838-1922), was an American merchant and philanthropist. He was born in Philadelphia and received little schooling. In 1860 he and his brother-in-law started a men's clothing business which grew into John Wanamaker and Company, one of the largest department stores in the United States. Wanamaker was active in politics for many years, and in 1889 he was appointed Postmaster-General of the United States. He took a great interest in philanthropy and in various religious welfare organizations.

H.U.F.



U&U

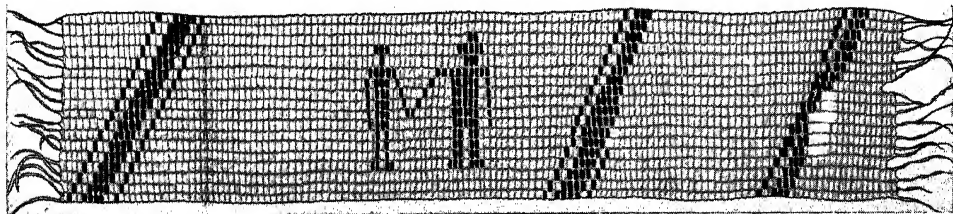
John Wanamaker, merchant and philanthropist

WANDERING JEW. An old Christian legend told of a Jew who was doomed to wander over the earth forever because he joined in the mocking of Jesus at the time of the Crucifixion. Many stories have been written about this Wandering Jew.

WANDERING JEW is the common name for certain kinds of plants belonging to the spiderwort family. They grow in Mexico and South America. The name refers to the old legend of the Jew who mocked Jesus as He carried the cross and who was doomed to wander over the earth forever. These plants seem to wander all over and live on indefinitely. They are grown as house plants for the beauty of their leaves, which have a silvery sheen. In the strong sunlight these leaves show white or cream stripes above, and reddish purple beneath. The plants require plenty of water, and may even be grown in vases of water as well as in soil. They also require plenty of sunlight to be grown at their best. They spread from roots on the creeping branches. They bear white or rose-red flowers. Both the leaves and stem of the wandering jew are juicy.

A.C.Ho.

Classification. The plants belong to the family *Commelinaceae*. The species are *Tradescantia fluminensis*, with



Wampum Belt Given to William Penn by the Indians, to Show Their High Regard for This Friendly White Man



J. Horace McFarland

The Wandering Jew's Striped Leaves and graceful flowers make it a favorite ornamental plant for indoor cultivation.

white flowers, and *Zebrina pendula*, whose blossoms are rose-red.

WANKS, or **SEGOVIA**, RIVER. See **HONDURAS** (Land and Its Resources).

WAPITI, *WAHP ih tih*. See **ELK**.

WAR. Since the dawn of history, men have fought against other men. Any struggle in which two large groups try to destroy each other is a war. Wars have been of many kinds. Families have fought against families, tribes against tribes, followers of one religion against the followers of another. In modern times, wars have usually been fought between nations or groups of nations.

Wars have always caused great suffering and hardship. Most people hate war, yet for hundreds of years war has been going on somewhere in the world nearly all the time.

War is a man-made disaster. Earthquakes and floods *happen* to mankind, but man makes war himself. To understand why wars go on when nearly everyone wants peace, we must look into the nature of war.

Causes of War. In modern times, no nation or group chooses war if it can get what it wants peacefully. The fighting starts when two groups disagree on a matter so important that each would rather go to war than give up getting its way.

War for Land to Live on. In ancient times, men often fought so that they could get enough to eat. When the pasture lands in Central Asia dried up, hungry tribesmen would make war on their neighbors in order to get new lands. The neighbors sometimes fought back. More often they gave up their lands and tried to seize those of a still weaker tribe. Waves of fighting sometimes swept over most of Asia and Europe in this way.

Much of the fighting that went on between early American pioneers and American Indians was this kind of war. The Indians wanted to roam freely over the land, hunting, trapping, or fishing. The pioneers wanted to clear the land and plant it in crops. Indian fighting was dangerous, and no one who already had a good

farm was likely to go out and fight the Indians for another. But landless men, some of them just released from debtors' prisons, preferred the dangers of war to the horrors of poverty.

This type of war has not entirely disappeared, but it is no longer common or important. The war for land to live on usually had these two important characteristics: those who did the fighting made the decision to fight, and the fighters wanted something for themselves.

War for Wealth. The peoples of ancient empires fought many wars for wealth. The decision to fight was made by the ruler and his advisers. The fighting was often done by hired armies. A king who sought to conquer new lands did not mean to drive the people out of the lands. Generally he just wanted to collect taxes from the people in the territory he invaded. His soldiers wanted riches or plunder they could steal.

When Alexander the Great led his armies against the Persian Empire, the common people of the invaded lands paid little attention, except to hope that their own property would not be destroyed. It made no difference to them whether one king or another collected the taxes. Wars were fought by the rulers and their armies, rather than by the people as a whole.

In the Middle Ages, there were many wars for wealth. Often one noble would try to seize the property of another. He would use his own soldiers and perhaps hire other leaders and their soldiers to help him. Sometimes the conqueror of a city would take a large money payment in return for leaving the city in peace.

In modern times, wars for wealth have generally been wars for colonies. In the Americas, in Asia, and in Africa, the great powers of Europe struggled first for the quick wealth of gold, diamonds, or furs. Then they struggled for the control of trade. Many colonies have probably not been worth the cost of conquering and holding. But some persons in each great colonizing country have gained riches, while the costs of the war have been paid by the nation as a whole.

War for Security. Most countries fear the possibility of attack, and keep armies and navies to defend themselves. Sometimes this fear may be directed toward a particular country. In that case a nation may decide to choose its own time and strike the first blow. Or it may decide to conquer some weaker neighbor, and thus increase its own resources as a defense against attack.

Differences between Causes and Reasons. When a nation makes war, its government always states the *reasons* for the war. This is necessary if the people are to be united in the war effort. But the reasons given for a war need not be the same as its *causes*. For example, the government of the United States pointed to the British interference with American shipping and the impressment of American seamen as reasons for the War of 1812. But the government said nothing about the desire of Westerners and Southerners to seize more land from the British in America. This desire was an important *cause* of the war, but it was not mentioned as a *reason*.

Causes of war may be selfish, base, or even wicked, but the reasons stated are usually lofty and noble. Both sides in a war generally have some right behind their reasons for fighting. But it is hard to find a war in which all the right is on one side,

War Means Absence of Law. War is not the only kind of struggle in which there is generally right on both sides. Almost every case that comes to trial before a court has this same quality. In a suit over property, both sides can usually show a claim of some sort. The court has to decide which is the *better* claim. If there were no court, both persons claiming the property might feel justified in fighting for it.

In frontier days many Westerners carried guns and settled their disputes by fighting. Until courts and police forces were established, they had no other way to settle quarrels in which both sides were partly right. People often joined forces against horse thieves and other "bad men," but they could not handle quarrels between honest men who disagreed about their rights.

Today a similar problem exists among nations. The people in any country are likely to see their own interests more clearly than they can see the interests of people in another country. People's own desires seem so reasonable and so important that the desires of people in another country are likely to look selfish and unreasonable. Laws and courts can take care of such disputes *within* a country, but there has as yet been no effective law between countries. That is why the use of force to settle a dispute is a *crime* within a country and a *war* between countries. War can exist only where there is no effective law.

Most Wars Have Several "Causes." In modern times, a nation usually does not make war for a single simple reason. There may be dozens or hundreds of causes for war. In every country there are groups of people with different aims and different hopes. When nearly all these groups are willing, each for its own reasons, to run the risk of war, war will almost certainly result.

For example, some groups in the United States wanted to enter World War I because they were angry at the German invasion of Belgium. Some groups wanted to make sure that Great Britain and France would win the war, so that these countries could pay what they owed to American businessmen. Some people feared there would be a business depression if the German submarine campaign became so effective that it could cut off the sale of American goods to the Allies. Some were sorry for the people who went down on the *Lusitania*. Others simply believed that the Germans were wrong and the Allies were right, and wanted to help the right side. A few people saw that it would not be safe for the United States to allow the British navy to fall into unfriendly hands. These are only a few of the many reasons that were mixed together in a general cry for war.

Depression and War. Some economists and historians think there is a close connection between war and economic depression. They argue that in a world-wide depression every country tries to protect itself at the expense of other countries. Each nation wants to cut down unemployment at home, and tries to make sure that nothing is bought from abroad which could be made by its own workers at home. This can easily be done by raising tariffs. It is sometimes called a way of "exporting unemployment" to other countries, and the other countries do not like it.

The chief concern of any government during a de-

pression is to get people back to work. One way to do this is by building armaments. If anger can be stirred up against a foreign country, or if people can be made to feel that they are in danger of attack, funds for military preparation are readily voted. Besides, the armed forces themselves give employment to many.

A modern democracy, such as the United States, would never risk war in order to end a depression or put people to work. But war often provides full employment and gives many people a larger share of food, clothing, and other good things than they can get in peacetime. For this reason, a long depression makes war seem less dreadful to those who have lost all hope, and may drive them to follow such leaders as Adolf Hitler.

War Aims and Peace Aims. War seldom accomplishes the complete results any side has hoped for. Many people with different purposes may unite to make war, but they often start quarreling among themselves when the war is over. In order to hold a warring people or group of countries together, peace aims are usually stated in vague, general terms, so that everyone concerned can see in them a promise of what he wants. When the victory is won, definite things have to be done which usually do not satisfy all the winners.

Methods of Warfare. Changes in the ways of waging war have had a great effect on the way people live. Some historians think that the idea of human equality came to be widely accepted because guns took the place of spears, swords, and arrows as the chief weapons of war. They point out that an armored knight in feudal days was more than a match for dozens of men who had no armor. But, these historians point out, the minutemen of Lexington and Concord, with guns in their hands, were equal or nearly equal to the same number of British soldiers. Following their theory, the historians go on to point out that when one fighting man became the equal of another, some men decided that voting was an easy way to tell how a fight over any given issue would come out. The idea of human equality gained strength when people accepted each person's right to cast a vote which carried as much weight and was just as important as any other person's vote.

Modern warfare has moved away from the days when soldiers with rifles were the most important part of an army. War has been mechanized until it is in large part a contest in producing machinery. In Thomas Jefferson's day, it made sense to protect "the right to keep and bear arms," so that people could overthrow a tyrannical government. Today, the private citizen cannot possibly keep the kinds of arms that would serve this purpose.

As the methods of warfare have changed, the cost of war has increased. Modern warfare has grown tremendously expensive. The daily average cost to the United States of waging the War of 1812 was about \$117,079. But World War II cost the United States a daily average of about \$250,000,000.

The Atomic Bomb, used by the United States against Japan in 1945, has brought another great change into warfare. After the invention of the bomb, it seemed clear that future wars would be short and terribly destructive. No one doubted that great cities could be destroyed and millions of people killed within a few hours. The only question was whether the nations of the world could

change their habits fast enough to keep war from breaking out. Most scientists agreed that a full-scale atomic world war would destroy civilization as we know it. See **ATOMIC BOMB**.

Total War. Even as late as the 1700's, most wars were fought by hired professional armies. The French Revolution produced the idea of the "nation in arms." To protect their young republic, thousands of volunteers became soldiers, and the "mass armies" of France surprised and dismayed the old-fashioned generals of Europe. Soon France set up a system of conscription or drafting, which called all able-bodied men between certain ages to protect the country. Napoleon's victories over many of the armies of Europe were won by armies raised in this way.

In World Wars I and II, the members of the fighting forces were not the only persons drafted and organized by the various governments. Whole nations were mobilized under a kind of state socialism, with much government control over manufacturing, transportation, farming, and mining. Total war has come to mean the use for war purposes of all the natural resources and man power of a country.

Is War "Normal"? Democratic countries take it for granted that peace is normal, and that war means something has gone wrong. But it is hard to say just where peace ends and war begins. Nations may be on unfriendly terms for years, building up their armies and navies, falling farther and farther under the sway of militarism, seeking allies, and trying to win control of each other's markets, without any actual clash of armed forces. Are these countries at peace? Or is peace in this case merely a rest period between wars to get ready for another war?

Many historians think that the period between World War I and World War II was not a period of peace, but a breathing spell between two parts of a single great war. Some even say that this war will not end until an international government is set up that will be strong enough to enforce order and outlaw war entirely. Many hope that the United Nations, with its world-wide organization and its international court, will prove to be the beginning of such a strong, universally-recognized, international government.

P.S.W., Jr.

Related Subjects. The reader is also referred to:

Army (with list)	Geneva Convention
Battles, Fifteen Decisive	Hostage
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Embargo	Prisoner of War
Espionage	

WARS

Balkan Wars	Russo-Japanese War
Boer War	Russo-Turkish Wars
Chinese-Japanese	Seven Weeks' War
Crimean War	Seven Years' War
Crusades	Spanish-American War
Franco-German War	Succession Wars
French and Indian Wars	Thirty Years' War
Hundred Years' War	War between the States
Mexican War	War of 1812
Peasants' War	Wars of the Roses
Peloponnesian War	World War I
Punic Wars	World War II
Revolutionary War in America	

WAR, PRISONER OF. See **PRISONER OF WAR**.

WAR ACES. By military custom, any pilot who shoots down five or more enemy planes is given the title of "ace." Until World War II, Captain Eddie Rickenbacker was America's greatest ace. Rickenbacker shot down twenty-six German planes during World War I. But he was not the greatest ace in the world. The German aviator, Baron Manfred von Richthofen, shot down eighty planes before he was killed in action in 1918. The French ace, René Fonck, was credited with destroying seventy-five planes, and the Canadian ace, Billy Bishop, shot down seventy-two.

Air power played an even greater part in World War II than it had in World War I. Several young American pilots quickly exceeded Rickenbacker's total. Major Richard I. Bong of the United States Army Air Forces became America's greatest ace, with forty Japanese planes to his credit. He later died in an airplane crash in the United States. Major Thomas B. McGuire, also of the army, came close to Bong's record. He had shot down thirty-eight planes before he was killed in the Philippines in 1945.

Commander David McCampbell was the Navy's top-ranking ace, with thirty-four planes to his credit. The Marine Corps' leading ace was Major Joe Foss, who destroyed twenty-seven Japanese planes. Major Gregory Boyington of the Marine Corps destroyed twenty-six Japanese planes before he was shot down and captured at sea in 1944.

Canada's leading air ace was Flight Lieut. George Beurling of the Royal Canadian Air Force, who shot down thirty-two German planes. Wing Commander J. E. Johnson, an Englishman who served in the Canadian air force, was credited with destroying thirty-five German aircraft. Major Alexander Pokryshkin was the Soviet Union's most famous air ace. Pokryshkin destroyed fifty-nine German planes between 1941 and 1945. But a number of pilots of the German air force exceeded this total. The superiority of German aircraft when the war began gave German pilots a great advantage over the pilots of other countries.

The total number of enemy planes shot down is probably greater for many of the war aces than the official records show. For a plane to be counted as shot down, it must be seen to crash or explode in the air. Many planes were crippled in the air and crashed sometime later out of sight. It is also difficult to total the number of planes shot down because often more than one plane takes part in the aerial battle.

F.S.M.

WARBECK, PERKIN (about 1474-1499), claimed to be an English prince and the rightful king of England. Warbeck was born in Tournay, Flanders, the son of poor parents. He worked as a servant in Ireland, and when people noticed his resemblance to Richard III he claimed that he was one of the two young princes supposedly murdered by Richard in the Tower of London. Many leading nobles supported his claim and several European kings who were enemies of Henry VII gave him their backing. In 1497 Warbeck landed in England and proclaimed himself King Richard IV. Henry VII captured him and forced him to admit he had lied. Afterward, Warbeck tried to escape and Henry ordered him hanged.



Chase Historical Society

WAR BETWEEN THE STATES. The War between the States was the unhappy struggle of a country divided against itself. The United States of America was less than a hundred years old when the war started with the attack on Fort Sumter, on April 12, 1861. Bitter warfare raged for almost four years, until General Robert E. Lee surrendered his Confederate army at Appomattox Court House, on April 9, 1865. But in sorrowful experience and bitterness, the United States had aged considerably more than four years. The hatreds, hardships, and grief of the war left wounds that have taken many years to heal.

The war was a struggle between two different ways of life, that of the North and that of the South. These different ways of life had existed in the United States almost since the time of the first settlers in America. There were many reasons for the differences between the North and the South. There were differences in the land, the climate, and the natural resources. These led the South to develop into a region of great farms and plantations, while the North developed into a region dominated by cities and manufacturing industry. The North and the South had different customs, and different ways of thinking.

The contest for political power between the North and the South began from the very moment the founders of the country started to draw up the Constitution. After the Constitution was drawn up and accepted, both the North and South upheld it firmly for a time. Then economic differences began to drive the North and the South apart. After 1820 the greatest problem of gov-

ernment in the United States was to hold the two sections of the country together. Time after time the North and the South seemed close to war. But the trouble was patched up each time, until war finally began in 1861.

After the war had ended, the country counted its losses. Almost 525,000 men had been killed in action, or had died as a result of wounds, disease, or starvation. The United States has not had such a high death toll in any war before or since. The money cost of more than \$5,000,000,000 was a sum much too high for the young country to take on easily. Families had broken apart, because brother fought against brother and father against son, as the strength of political convictions overcame the ties of family relationship.

Parts of the lovely South lay desolate. Fields that had once been green with crops were scarred with battle. Many fine old homes had been destroyed. The trade and agriculture of the South had been interrupted, and in some cases, completely destroyed. The South did not have enough money to feed and clothe its people or to pay its debts. So many young men had been killed in the war that the South lacked sufficient man power to make a speedy recovery from the ills of war. The people were helpless before dishonest politicians from the North who descended upon the stricken South.

Each side had fought bravely and well for what it considered right. But defeat in a war could not immediately change people's ways of thinking. Some bitterness and resentment were bound to linger, and some people of the North and the South "fought the war" long after it had ended. The United States had learned the hard

lesson that a war among its own people took an even greater toll than a war against another people.

Causes of the War

Indirect Causes. To understand the outbreak of the War between the States, we must first of all see how the two sections grew apart. In 1788 the North and the South had enough in common to be willing to unite in a single nation. In 1861 the South was willing to risk war in order to break up that Union. The changes that led to this great shift in attitude occurred in both sections of the country.

Changes in the North. When the Constitution was written, agriculture was the chief industry in all parts of the country. Banking and commercial interests were strong in New England, but even here most people got their living from the soil.

Before and during the War of 1812, America could get very little manufactured goods from Europe and manufacturing industries sprang up in the United States. Nearly all of these industries were in the North. After the Napoleonic wars, European manufactures could again be bought. But manufacturing, sometimes protected by a tariff, continued to grow in the North. See **TARIFF**.

Gradually the North developed into a land of businessmen, bankers, manufacturers, shopkeepers, and small, independent farmers. The people who made their living in these ways soon found that slavery was unprofitable to them. Many persons also began to object to slavery for moral and social reasons.

In the South. The early settlers had found the South ideally suited to the growing of plantation crops, such as tobacco, indigo, and cotton. When machines for spinning and weaving cotton were developed and widely used in Great Britain, the foreign demand for raw cotton from the South seemed to have no limit. (See **INDUSTRIAL REVOLUTION**.) The invention of the cotton gin made it enormously profitable to raise cotton with slave labor. Many responsible Southerners felt that cotton was so great a benefit to the world that it fully justified slavery.

Persons have often said that the South itself would have gotten rid of slavery gradually if it had not been for "Yankee interference." But many other persons have held that there is no evidence to support this view. These persons point out that the poor and landless whites of the South disliked slavery, but they did not want to see it destroyed. Most of them agreed with the rich planters that slavery was the only way to keep the South "a white man's country." In the years before the war, the South defended slavery as a positive good, rather than as a necessary evil. They agreed with John C. Calhoun that slavery was "the most safe and stable basis for free institutions in the world." By 1850 the South was clearly committed to making Negro slavery the permanent basis of its society, and to extending it as far as possible.

The Political Struggle. For many years the struggle between the North and the South for political power was hidden. The great political parties of the United States were national parties. So each party tried to satisfy the voters of all sections. But the statesmen knew, if the people did not, that the differences between North

and South were far greater than just the differences between Whigs and Democrats.

The rapid growth of population in the North soon made it clear that that section would control the House of Representatives. But power in the Senate was kept almost evenly balanced between the two sections. As for the Presidency, both parties knew that a good candidate had to satisfy all sections. For a long time the ideal presidential nominee was a northern man who sympathized with the South.

Party leaders and professional politicians tried hard to keep sectionalism out of national politics. But long before 1860 there had been many signs that either side which got full control of the national government would use that control to force its way of life upon the other section.

Direct Causes. In 1850 differences between the North and South had been patched up by a series of compromise measures. (See **COMPROMISE OF 1850**.) Among other things, these compromises settled the status of slavery in every square mile of the country from the Atlantic to the Pacific. Everyone knew which territories were closed to slavery, and the territories where slavery was permitted. Neither side was satisfied with the arrangement, but both political parties had promised to uphold it. The South took for granted that the struggle was finally settled.

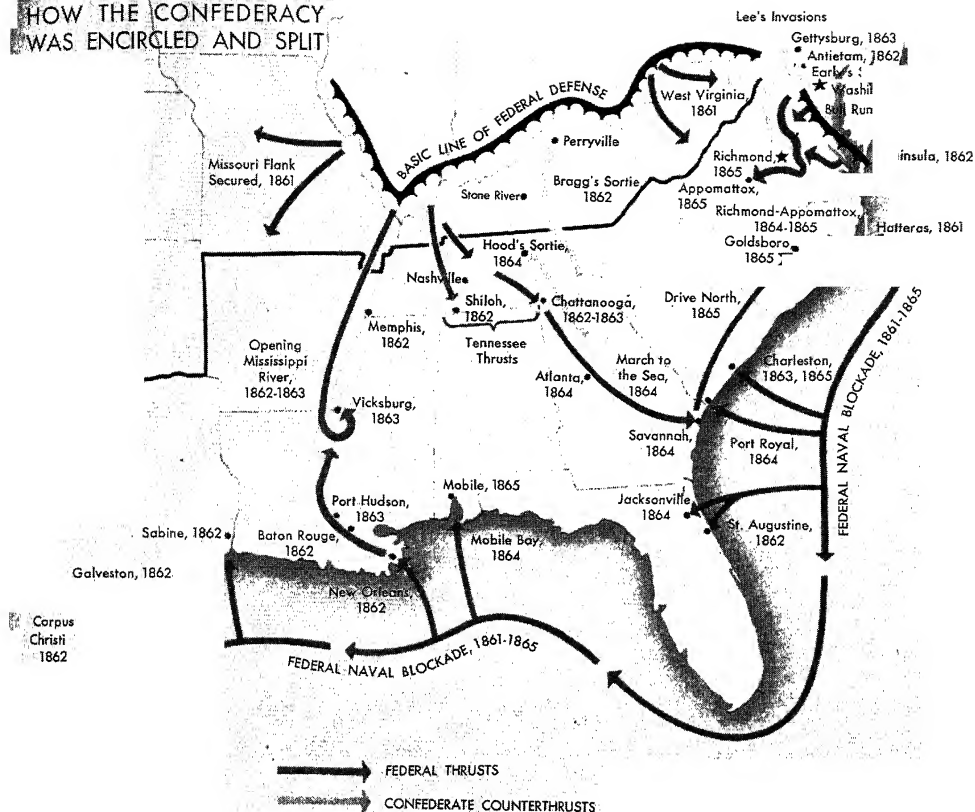
The Fugitive Slave Act. The Compromise of 1850 included a new law which made Federal officers responsible for the return of escaped slaves to their owners. Under this law, a United States marshal could order the citizens of a state to help him catch a runaway slave. A person arrested as an escaped slave could not testify in his own behalf or ask for a jury trial. Under the law, a commissioner got twice as large a fee for handing the Negro over to the master who claimed him as he did for declaring the Negro free.

In exchange for the Fugitive Slave Law, the South agreed to let California come into the Union as a free state. This gave the free states control of the Senate as well as the House. To the South, the exchange seemed a fair bargain, and the Southerners expected the Northerners to live up to it. But the Northerners did nothing of the kind. Antislavery men felt that slavery was a moral wrong, and that no law could make it right. Several states passed Personal Liberty Acts which almost ordered people to disobey the Federal laws. The activities of the Underground Railroad, which helped runaway slaves to escape, went on as usual. See **UNDERGROUND RAILROAD**.

Many persons have said that the South and the North had different views of the nature of the Federal Government. They say the South believed the United States to be a union of independent commonwealths, and the North believed the Federal Government to be supreme. But the Personal Liberty Acts and the Underground Railroad show clearly that the North did not always support the national government. Each section favored strong Federal power to help its own cause, but neither section hesitated to nullify Federal laws in order to gain its own ends.

The basic difference was this: both sections insisted upon keeping their separate ways of life without inter-

HOW THE CONFEDERACY WAS ENCIRCLED AND SPLIT



ference. The Southerners were not going to put up with abolitionists who helped slaves to escape or encouraged them to revolt. The Northerners were not going to have slaves hunted down in the streets of their cities. In these and many other ways the two sections were sure to interfere with each other. Neither section would permit this interference. Abraham Lincoln described the situation clearly and simply when he said, "A house divided against itself cannot stand. . . . This government cannot endure permanently half slave and half free."

Kansas-Nebraska Bill. After the Missouri Compromise of 1820, the northern boundary of slavery was recognized as $36^{\circ} 30''$. In 1854 Senator Stephen A. Douglas proposed a bill which would set aside this boundary line and permit the people of the Kansas-Nebraska territories to decide for themselves whether or not they wanted slavery. Historians have called this Kansas-Nebraska Act "probably the greatest error which the Congress of the United States ever committed." Most historians agree that Douglas wanted to get the territories organized in the hope that a railroad to the West might be built through them, thus increasing the value of his own large landholdings. The slavery provisions were put in the bill in order to win Southern support for its passage.

The passage of the bill was the signal for the first seri-

ous clash of arms between the North and the South. Both sides rushed settlers into Kansas because the bill provided that the settlers were to decide the question of slavery or free soil. Bloody fighting broke out, and bands of rioters marched up and down the land. More than two hundred persons were killed, and nearly two million dollars' worth of property was destroyed. See **KANSAS-NEBRASKA BILL**.

Election of Lincoln. Long before 1860 the Southern states had made it clear that they would secede from, or leave, the Union if the Northern states succeeded in winning full control of the national government. In 1860 Abraham Lincoln was elected President without carrying a single Southern state.

Lincoln had pledged himself not to interfere with the institution of slavery where it already existed. But the South knew that Lincoln was deeply convinced that slavery should not spread to the territories. South Carolina seceded as soon as it heard of Lincoln's election, and adopted the Ordinance of Secession on December 20, 1860. Within six weeks Mississippi, Florida, Alabama, Louisiana, Georgia, and Texas followed South Carolina's example. As a result of the states' secession, the war has sometimes been called the *War of Secession*. See **CONFEDERATE STATES OF AMERICA**.

The upper South was willing to give the Lincoln ad-

ministration a trial. Most of these states wanted to stay in the Union if it were at all possible. When Confederate guns fired on Fort Sumter on April 12, 1861, the upper Southern states had to decide whether they would remain in the Union or secede (see FORT SUMTER). When Lincoln called for troops to put down the rebellion, Virginia, Arkansas, Tennessee, and North Carolina determined to join the Confederacy.

Disagreement within the States. In discussing the causes of the War between the States, we have to use terms such as "the North" and "the South," as if all the people in these sections agreed with one another. This was by no means the case. The Union armies included men from every seceded state. One of the most successful Union agents in Europe, Robert J. Walker, had once been a United States Senator from Mississippi. Three of Mrs. Lincoln's brothers died fighting for the Confederacy. Some of President Lincoln's relatives were also Southern sympathizers.

In the same way the Confederate army contained men from every Northern state, who preferred the Southern way of life to their own. Some members of high society in New York City, Philadelphia, and Baltimore, favored the South throughout the war. Caleb Huse, a Confederate purchasing agent in Europe, was from Massachusetts.

Progress of the War

As we look back upon the War between the States today, the Southern cause appears to have been hopeless from the beginning. The North had overwhelming advantages in money and in industrial equipment. The North had a population of nearly twenty million free men, while the South had not more than six million whites and three and a half million slaves.

But the South was much better off than these figures suggest. The Confederacy did not have to conquer the Union. It needed only to defend its own territory until the Northerners got tired of war. Moreover, the South had one great psychological advantage. Southerners were defending their homes, their freedom, and their way of life. The North could have stopped the war at any moment without greatly or immediately changing Northern customs or ways. At all times during the war some groups in the North favored this course of action. But the South knew that the fight must go on until the Southerners won or were overwhelmed.

The South had many reasons to hope for victory. Most European authorities expected the Southerners to win their independence, not because they had the faintest chance of conquering the North, but because the North would weary of spending its men and wealth.

Another Confederate advantage was a two-months' start in military preparations. In addition, the South had the most capable group of commanders ever assembled by any nation at the outbreak of a war.

The War in 1861. The first serious battle of the war took place on July 21, 1861, near a small stream called Bull Run which lay south of Washington, D.C. The Union forces were defeated, and for a time the North feared that Washington would be invaded. The battle of Bull Run put an end to the North's plan of marching on Richmond, Va., and ending the war in ninety days. General George B. McClellan was placed in command of

the Union forces called the Army of the Potomac, and began the long task of making thousands of raw volunteers into an army. By autumn, the Union forces numbered 180,000 men, while the Confederates had only about 150,000.

War with Great Britain threatened the United States late in 1861 when an American vessel seized two Confederate commissioners from a British steamship. (See TRENT AFFAIR.) But the American Government released the men with apologies, and war was averted.

On April 19, 1861, President Lincoln proclaimed a blockade of the Southern ports. At first, the blockade existed only on the paper where its provisions were written, because the North had not yet organized its blockading forces. But three months later, four blockading squadrons were stationed off the important Confederate ports. The blockade did not close the Southern ports completely, but it cut off more than seven eighths of all Southern shipping.

The War in 1862. The Union plan of campaign in 1862 called for a steady drive toward the Confederate capital at Richmond, Va. In addition, the Union campaign called for the Northern armies to open the Mississippi, break the Confederate line in the West, march through the center of the Confederacy, and then move northward into Virginia.

The Federal armies in Kentucky and Tennessee advanced in a campaign against the Mississippi River. Under General Henry Wager Halleck, they undertook to break the strong Confederate line that extended from Kentucky to Columbus, Miss., and enter the heart of the South.

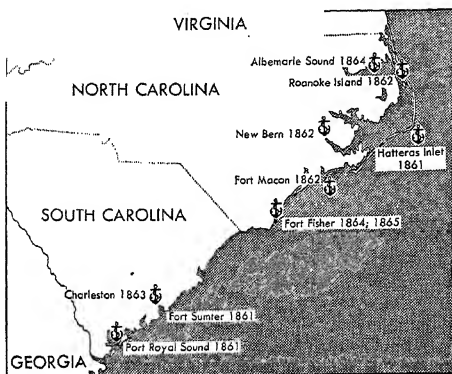
Halleck sent General Ulysses S. Grant to attack Fort Henry, but Commodore Andrew H. Foote captured the fort with his gunboats before Grant could reach the scene. Grant moved on to Fort Donelson. Here he wrote his famous message in reply to a request for terms of surrender: "No terms but unconditional and immediate surrender." The fort was surrendered and Grant moved into Tennessee and Mississippi. He was attacked by the Confederates at Shiloh, or Pittsburgh Landing, in Tennessee, and almost defeated. But reinforcements arrived under General Don Carlos Buell, and enabled Grant to win the battle. Grant then moved his army to Memphis, Tenn. From this point, Union forces could control the upper part of the Mississippi. Only Vicksburg and Port Hudson remained in Confederate hands.

At about the same time, Captain (later Admiral) David Farragut attacked the strong defenses of New Orleans from the south. Farragut had about fifty wooden warships. This was the strongest fleet that had ever been assembled under the American flag. The assault lasted a week before the city fell.

In the east, General George B. McClellan was advancing on Richmond. His advance, called the Peninsular Campaign, was well directed, but the skillful generalship of the Confederate leaders Robert E. Lee and "Stonewall" (Thomas Jonathan) Jackson alarmed the War Department at Washington. The Department promptly issued orders which made McClellan's victory impossible. He withdrew toward Washington, and General Lee followed up his advantage by advancing toward the Potomac and winning the second battle of



victory lay in being recognized by foreign powers. In his customary way, General Lee took the best chance open to him and led a splendid army of 70,000 across the Potomac River into the North. The outcome of the war depended upon the success of Lee's campaign. If Lee could threaten Washington and add terror to the discon-



Coastal Attacks by Union Ships effectively blockaded the chief Southern ports. The South depended on trade to keep its war machine going. On the map, the anchors show major bombardments and engagements which enforced the blockade.

tent of the North, it was doubtful that Lincoln's sorely tried government could continue the war. Lee's forces met General George G. Meade's army of more than 90,000 at the little town of Gettysburg in southern Pennsylvania. The greatest battle of the war was waged for three days. Lee was thrown back, and the Southern cause was lost.

On July 4, 1863, as Lee was beginning his retreat to the Potomac, the great Confederate stronghold of Vicksburg, Miss., surrendered to General Grant. The surrender came after a siege which had lasted seven weeks. Fort Hudson, the last Confederate post on the Mississippi River, surrendered five days later. These two surrenders left the Confederacy cut in two.

News of Gettysburg and Vicksburg put an end to Southern hopes for help from Europe. The motion before the British Parliament for the recognition of the Confederacy was withdrawn, and Napoleon III of France also gave up his schemes for coming to the aid of the South.

The North adopted a new plan for the war, known as the "anaconda policy," after the great snake called the anaconda which squeezes its victims to death. Generals Ulysses S. Grant and William T. Sherman were to move eastward from the Mississippi, while the Army of the Potomac pressed down upon Richmond.

In July, Federal troops under General William S. Rosecrans took Chattanooga, Tenn., and pursued the withdrawing troops of General Braxton Bragg across the Tennessee River into the mountains of northwestern Georgia. Here Bragg turned suddenly at Chickamauga Creek and completely routed the Union army. General George H. Thomas saved the Union Army from destruction by holding the left wing firm against superior forces. By his action, Thomas won the name "The Rock of

Chickamauga," and took over Rosecrans' command. Bragg took a strong position on the heights above Chattanooga (Lookout Mountain, and Missionary Ridge), and besieged the city. General Grant arrived at Chattanooga with strong reinforcements in October, and a month later drove Bragg's armies from their strongholds. The Confederate troops then retreated into Georgia.

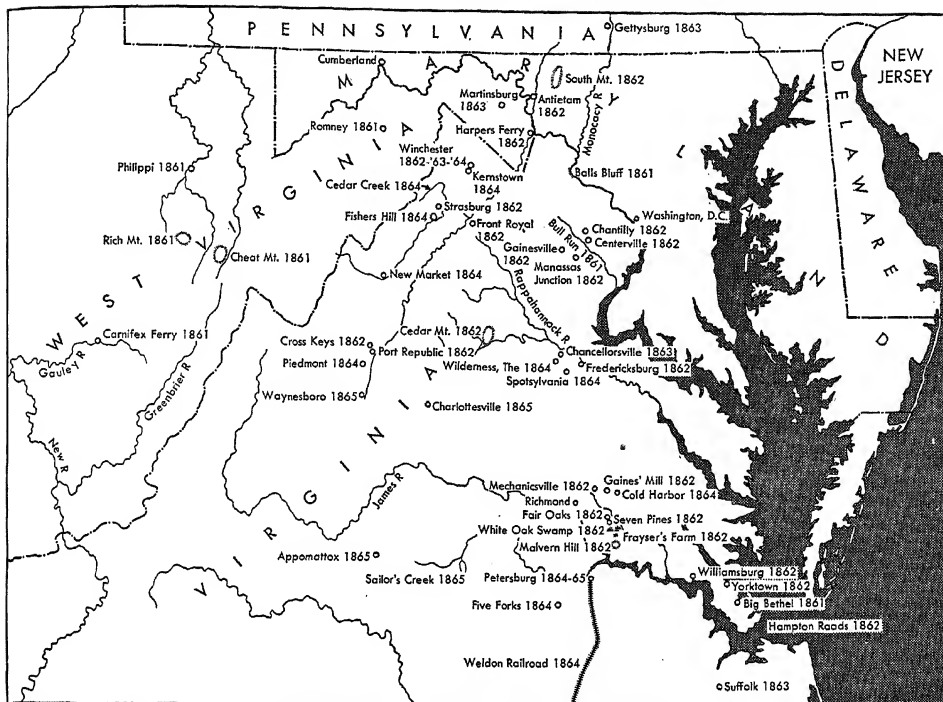
The War in 1864. On March 9, 1864, General Grant was given command of all the armies of the United States. He made his headquarters with the Army of the Potomac, and appointed General Sherman to take his place in command of the armies of the west. Grant assigned to Sherman the task of defeating General Joseph E. Johnston's troops in northern Georgia. Grant himself undertook to capture Richmond. Grant and Sherman began their campaigns on the same day.

Sherman advanced against Johnston at Dalton, Ga., but cut around the flanks of the Southern army when he found the Confederates entrenched. Johnston offered battle at Resaca, Ga., but Sherman refused to fight and made another flank movement. Finally Sherman attacked at Kennesaw Mountain in Georgia, but failed to defeat Johnston. Johnston was then replaced by General John Bell Hood. Sherman defeated Hood in three battles outside Atlanta, Ga. Sherman and his troops entered Atlanta on September 2. In November, after destroying the city, Sherman began his famous march from Atlanta to the sea.

The Confederates hoped to draw Sherman back to support General George H. Thomas, who was hard-pressed at Nashville, Tenn. But Thomas destroyed Hood's army in the battles of Franklin and Nashville, and Sherman cut a path sixty miles wide through the heart of the Confederacy. Sherman's march to the sea was the most spectacular event of the war. On December 21, Sherman captured Savannah, Ga., on the coast, and, in the spring, turned northward to unite his troops with those commanded by Grant.

In the east, during May and June, Grant's troops fought with the forces commanded by Lee and General James Longstreet in the low, tangled underbrush and swampy lands known as "the Wilderness." Several engagements fought from June 25 to July 1, 1862, were known as the Seven Days' Battles. Grant lost over sixty thousand men in his drive on Richmond, but he declared he would fight on that line if it took all summer. It took even longer than that, for Lee retreated into Richmond and fortified himself there. Grant then laid siege to the Confederate capital. General Ambrose E. Burnside laid mines about the Confederate fortifications at Petersburg, Va., southwest of Richmond. When the mines were exploded, Union forces tried to break through the Confederate lines. But they were stopped by a deadly Confederate resistance. General Philip H. Sheridan, finally drove the Confederates from the Shenandoah Valley after the battle at Cedar Creek, and thus separated Lee's army from an important source of supplies.

Two successful naval actions raised the hopes of the North. In June the Confederate raider *Alabama* was sunk off the coast of France (see ALABAMA, THE). On August 23, Admiral Farragut's daring capture of the forts of Mobile Bay took from the Confederacy its last



Major Engagements of the War in the East

stronghold on the Gulf of Mexico. Partly on the basis of these two victories, Lincoln was re-elected President.

End of the War. Lee was bottled up in Richmond with about forty thousand men. The besiegers had over a hundred thousand troops. Grant took Petersburg on April 2, 1865, and Lee and his troops retreated from Richmond April 3. President Jefferson Davis escaped to North Carolina. On April 9, Lee surrendered what remained of the Confederate Army at Appomattox Court House in Virginia, seventy-five miles west of Richmond.

Cost of the War. The South suffered far more than the North from the conflict. The Union enlisted a total of 2,667,000 men who saw service in the field, besides about 50,000 who were drafted and held in reserve. The Confederates enlisted about 1,400,000 men during the four years. The Federal Army never included more than a million men at one time, and the Confederates never had more than half this number in the field. On the Union side, 110,000 men were killed in action or died of wounds, and 250,000 more died of disease or starvation. The Confederates lost about 75,000 killed or fatally wounded, and about 90,000 from disease and starvation.

The Federal blockade destroyed Southern trade. Southern industry was almost as completely destroyed as its trade. In the North, foreign trade did not suffer much, and the war actually helped the growth of industry in many lines. Above all, the South had to bear the destruction that came from being used as the chief battlefield.

The war itself cost the North about \$3,500,000,000. The Federal Government later spent more than twice that amount in pensions. The money cost of the war to the Confederates was about \$2,000,000,000.

Principal Battles

The War between the States was a war of many battles. The battles described below include only those which are famous as military exploits and those which had an important bearing on the final outcome of the war.

Antietam (September 17-18, 1862) has been called the bloodiest battle of the war. It checked Lee's first attempt to invade the North. The battle was fought at Antietam Creek, near Sharpsburg, Md. The Confederate forces of 40,000 men, were opposed by a Federal force nearly twice that large, under General George B. McClellan.

On the second day of the battle, the Federal dead numbered 12,400 and the Confederate dead about 10,000. The retreat of the Confederates on September 18 gave the North the victory for which Lincoln had waited before announcing the Emancipation Proclamation.

Bull Run. Two battles were fought near Bull Run, a small creek in northeastern Virginia. Both battles ended in Confederate victory, and gave the South reason to hope they could win the war. The battles are often called the battles of Manassas, after a small town near by.

The First Battle was fought July 21, 1861. It was the first serious conflict of the war. The Federal troops were commanded by General Irvin McDowell, and the Confederates by General Joseph E. Johnston and P. G. T. Beauregard. About 18,000 men took part on each side. Both armies were made up of poorly trained volunteers.

McDowell began the battle by sending a force to turn the left wing of the Confederate army, posted along Bull Run. The movement was carried out successfully, and at first it appeared that the Federal armies had won the victory. But "Stonewall" Jackson's brigade held its position on a small hill throughout the fight. Reinforcements came to his aid, and the Confederates turned an apparent defeat to victory. The Union armies were driven from the field in disorder. Federal losses were about 2,800, and Confederate losses about 2,000.

The results of the battle were far-reaching. The North realized for the first time that it was in for a long fight, and began preparations for serious war. The Confederate cause gained great prestige, both at home and overseas, and Confederate confidence in victory ran high.

The Second Battle was fought on August 29 and 30, 1862. It marked the close of General John Pope's campaign in Virginia. Pope's army of about 64,000 men lay encamped along the Rappahannock River to protect the defenses of Washington. On August 26, "Stonewall" Jackson, with a force of about 25,000 men, destroyed the Union supplies at Manassas and Bristow, in northern Virginia. Three days later Pope ordered an attack on the Confederates. Meanwhile, the Confederate Generals Lee and Longstreet had succeeded in joining forces with Jackson.

Both sides claimed the victory at the end of the first day. At noon on the following day, the Federal troops made an unsuccessful attack, and Longstreet's army drove them from the field. The Confederates lost fewer than 10,000 men, and the Union forces nearly 15,000. Pope then led his army back to Washington, while Lee followed up the advantage of his victory to begin his first invasion of the North.

Chancellorsville (May 2-4, 1863). The Federal Army of the Potomac, under the command of General Joseph Hooker, was entrenched on the north side of the Rappahannock River. In April, Hooker began a movement against Lee's Army of Northern Virginia, stationed across the river at Fredericksburg, Va. Hooker had about 130,000 troops, and Lee less than half that many.

Hooker crossed the river and took a position at Chancellorsville, Va. Part of his troops, under General John Sedgwick, were ordered to cross the river below Fredericksburg, in order to catch Lee between two forces. Instead, Lee succeeded in catching Hooker's army between two Confederate flanks, and the Union forces were completely defeated. On the following day, Lee attacked and defeated General John Sedgwick and the Union Army retreated across the Rappahannock. Union losses were estimated at 17,300 and Confederate losses at about 12,460.

Chattanooga (November 23-25, 1863). General Braxton Bragg, with a Confederate army of 40,000, had defeated the Federal troops at Chickamauga, and had then encamped before Chattanooga. His lines extended along Missionary Ridge from Lookout Mountain for about twelve miles. The Union armies mapped out a campaign all along this line. General Sherman was to attack the extreme right flank of the Confederate army, and advance along Missionary Ridge toward the Confederate center. General George H. Thomas was to attack in the center, and General Joseph Hooker was to strike the extreme left.

Thomas was successful in driving back the first troops that Bragg sent forward. Sherman pressed forward until he was stopped at a strongly fortified gap in the mountain ridge. A famous but unimportant part of the battle was a skirmish on Lookout Mountain, when Hooker's troops drove out the Confederates. This battle came to be known as the "Battle above the Clouds." The final victory came on the afternoon of November 25, when Thomas' troops stormed up Missionary Ridge under heavy fire and drove the Confederates in confu-

sion from the summit. This remarkable and spectacular feat ended the battle. The killed and wounded numbered 2,521 on the Confederate side, and 5,475 on the Federal side.

Chickamauga (September 19-20, 1863). After the Confederate defeat at Chattanooga, General Bragg led his troops southward, pretending to retreat. He was closely followed by a Federal army under General William S. Rosecrans. Near Chickamauga Creek, in northwestern Georgia, Bragg suddenly turned and began battle. The Federal force of 57,000 was outnumbered by Bragg's 71,000. On the second day of the battle, a division was withdrawn from the right side of the Union Army through a misunderstanding of orders. The Confederate General James Longstreet seized this opportunity to drive forward with a detachment of troops. The raid threw the entire right and center of the Union Army into confusion, and drove the Union troops back toward Chattanooga.

General George H. Thomas, commanding the left side of the Union Army, had to face an attack from the entire Confederate army. He held his ground throughout the day and retired in good order on the command of Rosecrans. Federal losses were over 16,000 and Confederate losses about 17,800.

The site of the battle of Chickamauga is now a national military park. Historical guide marks have been built at various points on the field, and there are several lofty observation towers.

Fair Oaks, also known as the **Battle of Seven Pines** (May 31-June 1, 1862). This battle was fought in Virginia during General George B. McClellan's Peninsular Campaign. It is sometimes called Fair Oaks, after a near-by town seven miles east of Richmond, and sometimes Seven Pines, after a tavern on the battlefield.

After the battle of Williamsburg, Va., Confederate troops under General Johnston began a slow retreat toward Richmond. McClellan, who was following him, sent the left rear wing of his army across the Chickahominy River. Johnston sent a Confederate force to attack this wing, and only the arrival of reinforcements saved the Federals from serious defeat. The Confederates were then driven back with heavy losses. On the following day, after the Federal left wing had driven off an attack by General Longstreet, General Lee took command of the Confederate troops. The Federal loss was 5,739, and the Confederate loss 6,697.

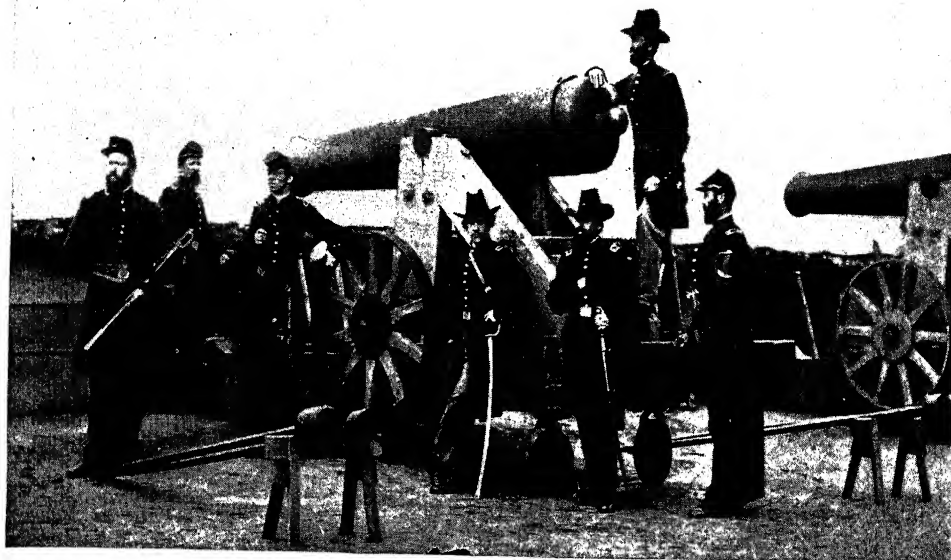
Fort Henry and **Fort Donelson** controlled the entrance into Tennessee and the states farther south. Fort Henry was on the right bank of the Tennessee River, and Fort Donelson on the left bank of the Cumberland River. The distance between the two forts was about twelve miles.

On February 6, 1862, a fleet of Union gunboats under Commodore Andrew H. Foote attacked and captured Fort Henry. Most of the Confederate troops escaped to Fort Donelson and reinforced the garrison there. Fort Donelson at first successfully withstood the attack of land troops under General Grant, but later began to weaken. During the night of February 15, Confederate Generals John B. Floyd, Gideon Pillow, and Nathan B. Forrest took 5,000 men and escaped from the fort.

General Simon Bolivar Buckner was left in command of the Confederate troops. He saw that the situation was hopeless, and asked Grant for terms of surrender. General Grant replied in words that immediately became famous: "No terms but unconditional and immediate surrender can be accepted." General Buckner then surrendered 12,000 men and large amounts of ammunition and other supplies.

Fredericksburg (December 13, 1862). After General Lee was defeated at Antietam, he retreated from the North, and established himself on the high bluff overlooking Fredericksburg, Va., on the south side of the

ARTILLERY



Union Officers of the War between the States hold rigid positions for the famed photographer, Mathew Brady. In

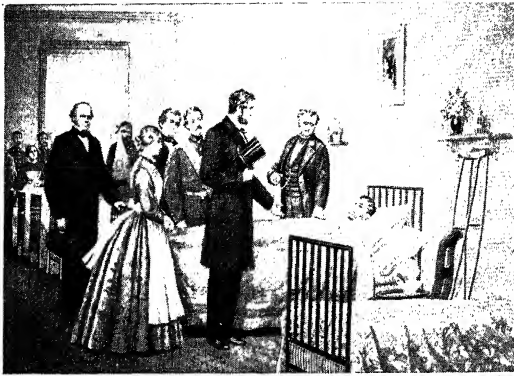
spite of his cumbersome and complicated equipment, Brady's photographs are a remarkable picture record of the war.



A Thirteen-Inch Mortar and Gun Crew, photographed near Petersburg, Va. The stubby, pot-shaped weapon was

mounted on a railroad flatcar. The gun was built for coastal defense, but was used to bombard cities during land sieges.

Photos: Chicago Historical Society



Joseph Boggs Beale, Modern Enterprises

President Lincoln Visits a Wounded Soldier in a military hospital during the long and bloody War between the States.

Rappahannock River. General Ambrose E. Burnside, with about 114,000 Federal troops, was on the opposite side of the river. Burnside's army crossed the river in three divisions and advanced against Lee. After six assaults had been beaten off, Burnside withdrew with a loss of about 12,600 men, against Confederate losses of 5,300. As a result of this defeat, Burnside was removed from the command of the Army of the Potomac.

Gettysburg (July 1, 2, 3, 1863). The decisive battle of the War between the States took place at Gettysburg, Pa. It was fought between Lee's magnificent Army of Northern Virginia, numbering about 70,000, and General George G. Meade's Army of the Potomac. Meade's army was about 100,000 strong, but only 93,500 Federal troops took part in the field operations.

Lee's second invasion of the North had begun on June 3. Advanced forces of the two armies faced each other at Gettysburg on July 1.

Gettysburg lies at the foot of two ridges. Seminary Ridge, where Lee had stationed his army, rises a mile to the west of Gettysburg. Federal troops took up a strong defensive position on Cemetery Ridge, which lies directly south of Gettysburg. Cemetery Ridge is shaped like a fishhook. There are three elevations on its summit. Culp's Hill rises at the barb of the hook, and Little Round Top and Round Top stand at the other end.

During the first two days fighting, each commander brought nearly his entire army into action. Losses were heavy on both sides. The Confederates drove back the left flank of the Union Army, under General Daniel Edgar Sickles, and secured a foothold on part of Culp's Hill. But Union forces drove Confederate troops out of this position on the morning of July 3.

The crucial attack of the battle began at one o'clock on the third day. Lee, acting against the advice of General Longstreet, made a direct assault on the Union center, which was commanded by General Winfield Scott Hancock. For nearly two hours the valley between Cemetery and Seminary ridges was filled with the sounds of furious shelling and battle. Then the Confederate commander found his ammunition running low, and ordered General George E. Pickett to charge.

Pickett's charge is one of the most daring and magnificent attacks in history. Fifteen thousand of the best troops of the Confederate Army swept across the valley and up the slopes of Cemetery Ridge. They moved directly into a murderous fire. They carried the first line of the Federal center in a desperate hand-to-hand fight, but flesh and blood could not withstand the storm of shot and shell that met them. For twenty dreadful minutes the Confederates held their ground. Then they yielded to superior force and fell back, a pitiful remnant of the gallant army that had attacked an hour before. Those twenty minutes at Gettysburg were the high tide of the Confederacy. From that time on, the Southern cause declined.

WAR BETWEEN THE STATES

By the morning of July 5, the Confederates had started back toward Virginia. No attempt was made to pursue them. Union losses at Gettysburg were estimated at 23,003, and Confederate losses at 28,451.

Kenesaw Mountain (July 27, 1864). A Federal army of about 95,000, under General Sherman, was marching from Chattanooga to Atlanta. General Joseph E. Johnston's army of 60,000 Confederates was retreating before Sherman. Johnston finally entrenched his army at Kenesaw Mountain in Cobb County, Georgia. There it was attacked by Union troops under Generals McCook and Logan. The Federal attack was beaten off and General McCook was killed. Federal losses were about 3,000. Confederate losses were about 800.

Lookout Mountain. The so-called Battle of Lookout Mountain was really only an important skirmish in the Battle of Chattanooga. (See CHATTANOOGA, above.) Lookout Mountain is a tall, narrow plateau 2,126 feet high. It is now the site of a national military reservation.

Malvern Hill (July 1, 1862). This fight was the last of the so-called Seven Days' Battles, during General McClellan's Peninsular Campaign. It was fought at Malvern, Va., southeast of Richmond. McClellan's Army of the Potomac and Lee's Army of Northern Virginia each numbered about 80,000 men. Lee cut McClellan's communication with his base of supplies on the York River, and McClellan retreated to Malvern Hill, a strong position near the James River. The Confederates attacked, and the battle that followed was one of the fiercest of the war. It lasted from early morning until the Confederates withdrew in the evening. The Confederate loss was about 5,000, while the Union lost only about one third that many.

Murfreesboro, or Stone River (December 31, 1862-January 3, 1863). In this battle, a Federal force of about 44,000 under General Rosecrans met a Confederate force of about 27,000 under General Bragg on the Stone River near Murfreesboro, Tenn. On the first day of the battle, the Confederates drove back the Federal forces and scattered the entire right wing of the Union Army. Some of the Union generals advised retreat, but Rosecrans announced his determination to hold the position. The battle shifted back and forth for nearly three days. Bragg then retreated about thirty miles in order to block the advance of Federal troops toward Chattanooga. The battle of Murfreesboro cost the Union Army about 10,000 killed and wounded. Confederate losses were about 9,000.

Petersburg, Siege of (June, 1864-April, 1865). This famous siege ended successfully the Union campaign against the Confederate capital at Richmond, Va. After Lee had checked the Federal advance at Cold Harbor, Va., June 3, 1864, General Grant shifted his army to Petersburg, Va. His purpose was to capture the city and thus force Lee to get out of Richmond, which was only twenty-one miles away. On June 15, a Federal attack failed to take Petersburg. Several later attacks were also unsuccessful. In July the Union troops made a spectacular attempt to blow up part of the Confederate fortifications and charge through the gap made by the explosion. But the attempt ended in failure. The mine was successfully exploded, but inefficient leadership during the charge caused the Federal troops to be trapped, with a loss of nearly 4,000 men.

The siege lasted seven months longer. As it drew to a close, Grant sent Sheridan to destroy the railroad which carried supplies to Richmond. Lee sent forces to meet Sheridan, but the Confederates were defeated at the battle of Five Forks on April 1, 1865. On the following day, Grant ordered a final attack on Petersburg, which fell after a gallant defense. On April 3, the Federals drove Lee into hopeless retreat and marched into Richmond. On April 9, 1865, Grant and Lee met at Appomattox Court House and arranged terms for the surrender of all Confederate forces in the field.



Library of Congress

Union Soldiers in the War between the States line up for mess. The men lived in crude huts, and suffered severely

from cold during the winter months. Covered wagons were used to haul food, supplies, and ammunition to the armies.



Chicago Historical Society

General Burnside's Troops Cross the Rappahannock River In the Disastrous Assault on Fredericksburg



"The Mother's Sacrifice." A mother bids farewell to her little son, who is leaving to serve as a drummer boy in the Union Army.

Pittsburg Landing, Battle of. See SHILOH, below.

Shiloh, or Pittsburg Landing (April 6-7, 1862). General Grant, with about 33,000 troops, was advancing along the Tennessee River. His purpose was to capture Corinth, Miss., a strong Confederate railroad center. Grant broke his march near a log chapel called Shiloh Church, and encamped to await reinforcements from General Buell at Nashville, Tenn. Grant had no fear of an attack, and chose his position for convenience rather than for defense. But General Albert S. Johnston, with about 40,000 Confederate troops, made a surprise attack on the Union forces and drove them back from their position. Johnston himself was killed, and General Beauregard took his place.

On the morning of April 7, the expected reinforcements from Buell's army arrived, along with a force under General Lew Wallace. The Confederates were defeated, and Grant continued toward Corinth, which he captured a month later. Confederate losses in the battle of Shiloh were 14,687. The Union armies lost 13,673 men.

Spottsylvania Court House (May, 1864). After the campaign in the Wilderness, General Grant moved toward Richmond. In an attempt to check Grant's plan, Lee massed his army at Spottsylvania Court House, Va., about fifty miles from Richmond. Here a series of battles was fought between Federal troops under General George G. Meade and the Confederate Army of Northern Virginia under General Lee. Fighting went on throughout six days, but the Confederates held their position. Each side lost more than 8,500 men. From this battlefield, General Grant sent his famous message to General Halleck at Washington: "I propose to fight it out on this line if it takes all summer."

Vicksburg, Siege of (May 14-July 4, 1863). Vicksburg was the last great Confederate stronghold on the Mississippi River. After several attempts to take the city had failed, General Grant decided to attack from the rear. In April, 1863, Union gunboats and supply ships ran past the Confederate gun batteries in the dead of night and established a base on the river below the city. Grant then moved south on the western bank of the river, crossed at Grand Gulf, marched northeast to the important railroad center of Jackson, and then turned west. His lines surrounded Vicksburg, and the siege was begun after a direct attack failed. The people of Vicksburg held out under great hardship until July 4. Then General John C. Pemberton surrendered the city. This Union victory cut the Confederacy in two and deprived the eastern Confederate states of supplies from Texas and Mexico.

Wilderness (May 5-6, 1864). The battle of the Wilderness took place in a tangled forest region south of the Rapidan River in Virginia. General Grant's army of 118,000 entered the Wilderness on May 4, 1864. They were opposed by the Confederate Army of Northern



Chicago Historical Society; Joseph Boggs Beale, Modern Enterprises

The Soldier's Return meant a joyous reunion after the danger of battle.

Virginia under Lee. The Confederate forces numbered about 62,000. The battle raged for two days without important results. It was Grant's first important battle as supreme commander of the Union armies, and marked the opening of his Richmond campaign.

Yorktown, Siege of (April 4-May 4, 1862). The Confederate General John Bankhead Magruder held Yorktown, Va., with a force of about 15,000 men. He was besieged by about 53,000 Federal troops under General McClellan. Later reinforcements brought the Confederate strength up to about 55,000, and increased the Federal troops to about 95,000. On the night of May 3, General Joseph E. Johnston, who had taken command of the Confederate forces, secretly evacuated the town and retreated toward Richmond. The Union Army pursued him. A sharp rear guard action was fought May 5 at Williamsburg, Va., but Johnston succeeded in retreating.

Naval Engagements

There were few important naval engagements during the War between the States. The North had overwhelming superiority at sea, but this was due to Southern weakness rather than to Northern strength. Congress had begun to build a new steam navy in 1850, but only twenty-four steamers had been finished and put in use, and only twelve of these were in home waters. The sixteen sailing vessels in the navy turned out to be of little or no use, for they were hopelessly out of date. For some years, American inventors had been planning "ironclads," or ships plated with metal. These ships had already proved their worth in Europe, but the United States Congress had refused to appropriate the funds necessary to build the ironclads.

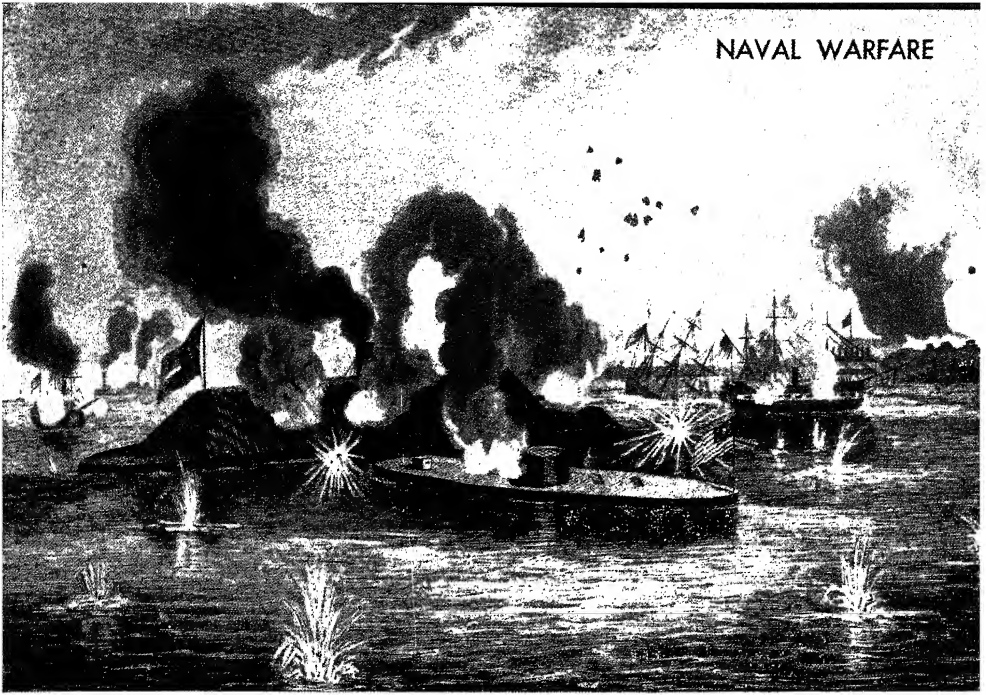
It was clear that the blockading of the Confederate coast was a necessary part of any Northern strategy. Blockading 3,550 miles of coast line with a handful of ships and very few sailors was a difficult problem. A shipbuilding program was begun at once, and many steamers of every kind were purchased.

Most of the fighting at sea involved raids on trading vessels or attempts to break through the blockade. In addition, the North made use of combined land and sea operations at several places. The naval operations described below were of outstanding importance.

The Alabama. For the story of the exploits of the Confederate raider *Alabama* and of its final battle with the U.S.S. *Kearsarge*, see ALABAMA, THE.

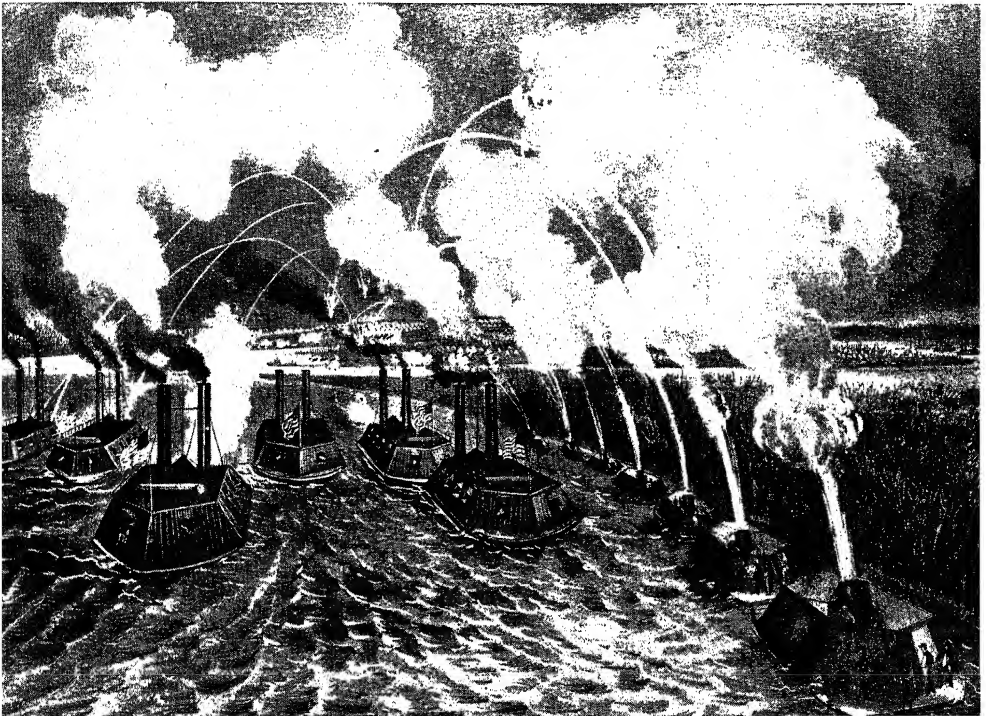
Mobile Bay (August 5, 1864). This engagement was fought between a United States squadron under Admiral David G. Farragut and a Confederate fleet which had been doing great damage to Federal shipping. The en-

NAVAL WARFARE



The Battle between the *Monitor* and the *Merrimack* marked the decline of wooden warships. The ironclad vessels

fought the historic engagement at Hampton Roads, Virginia, March 9, 1862. The *Merrimack* withdrew after four hours of combat.



trance to Mobile Bay in Alabama was protected by Forts Morgan and Gaines. The Gulf Channel, except for a narrow passage under the guns of Fort Morgan, was closed by piles and torpedoes.

Fighting began at 7 o'clock on the morning of August 5. Farragut guided his fleet through the lines of the Confederate batteries and burning rafts, and finally reached the harbor. Here the ironclad ram *Tennessee* and three gunboats were lying in readiness for an attack. Farragut sent his vessels directly across the torpedoes, sank one Confederate gunboat, and drove another aground.

The *Tennessee* attacked the entire Federal fleet, but was soon disabled and forced to surrender. Fort Gaines surrendered on August 7, and Fort Morgan on August 23. Farragut lost only one vessel, the *Tecumseh*, which was torpedoed. He did not capture Mobile, but he did cut off its communication with the sea.

Monitor and Merrimac (March 9, 1862). The *Monitor*, invented by Captain John Ericsson, was the first successful ironclad vessel in the United States Navy. It was built at Green Point, on Long Island, between October, 1861, and January, 1862. The *Monitor* was 172 feet long, and lay so low in the water that its flat iron-plated deck was only two or three feet above water level. The revolving turret was made of iron so thick that it could stop a heavy cannon ball, and contained two eleven-inch guns.

The *Monitor* was launched January 30, 1862. On March 6, under the command of Captain John Worden, it sailed for Hampton Roads to meet the *Merrimac*. This was a Confederate ironclad ship which had destroyed a number of vessels in the harbor and had been renamed the *Virginia*. After a four-hour battle, the *Merrimac* was defeated and withdrew to Norfolk, Va. Later the Confederates themselves destroyed their ship. The Union ironclad, the *Monitor*, was undamaged by the broadsides of the *Merrimac*.

This naval engagement showed the value of armored vessels, and also of Ericsson's "cheesebox-on-a-raft" design. See ERICSSON, JOHN. W.B.H.

Related Subjects. The reader is also referred to:

Abolitionist	Harper's Ferry
Carpetbagger	Mason and Dixon's Line
Confederate States of America	Missouri Compromise
Confederate Veterans, United	Nullification
Dred Scott Decision	Reconstruction
Emancipation Proclamation	Slavery
Fort Sumter	Sons of Confederate Veterans
Fugitive Slave Law	Sons of Union Veterans of the Civil War
Hampton Roads Conference	States' Rights

BIOGRAPHIES

Beauregard, Pierre	Kearny, Philip
Beecher, Henry Ward	Kirby-Smith, Edmund
Bragg, Braxton	Lee, Robert E.
Brown, John	Lincoln, Abraham
Buckner, Simon Bolivar	Longstreet, James
Burnside, Ambrose E.	McClellan, George
Butler, Benjamin F.	Brinton
Cooke, Jay	Mallory, Stephen Russell
Davis, Jefferson	Mason, James Murray
Early, Jubal A.	Meade, George G.
Farragut, David Glasgow	Morgan, John Hunt
Forrest, Nathan Bedford	Pickett, George E.
Gordon, John Brown	Polk, Leonidas
Grant, Ulysses S.	Rosecrans, William S.
Hooker, Joseph	Sheridan, Philip H.
Jackson, "Stonewall," T. J.	Sherman, William T.
Johnston, Albert S.	Stephens, Alexander H.
Johnston, Joseph E.	Stuart, James E. B.

Questions

When did the War between the States begin? How long did it last?

How did the loss of lives during this war compare with the losses in other wars which the United States has fought?

What was the Fugitive Slave Act? How did it affect feelings about slavery in the North? In the South?

Why was the Kansas-Nebraska Bill "probably the greatest error which the Congress of the United States ever committed"? How did it happen to get passed?

Which was better prepared for war in 1861, the North or the South?

What two Northern victories put an end to the South's hope of aid from Europe? What was the "anaconda policy" which the North adopted?

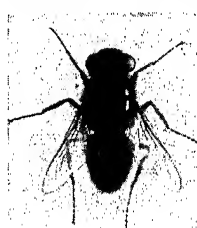
When did Sherman make his famous march to the sea? What was his purpose?

When and where did the Confederate forces surrender?

For what is each of these battles best known?

(a) Antietam; (b) The First Battle of Bull Run; (c) Chickamauga; (d) Gettysburg?

WARBLE FLY. The young, or larvae, of this fly live under the skin of cattle and other animals. The best-



Adult Female Warble Fly

known are two kinds called *ox warble flies*. The adult lays the eggs on the feet or legs of the cattle. The larvae then work their way through the skin into the animal's body and move through the flesh until they reach the back. There they live under the skin, causing painful swellings which are called *warbles*. See also BOTFLY. E.W.T.

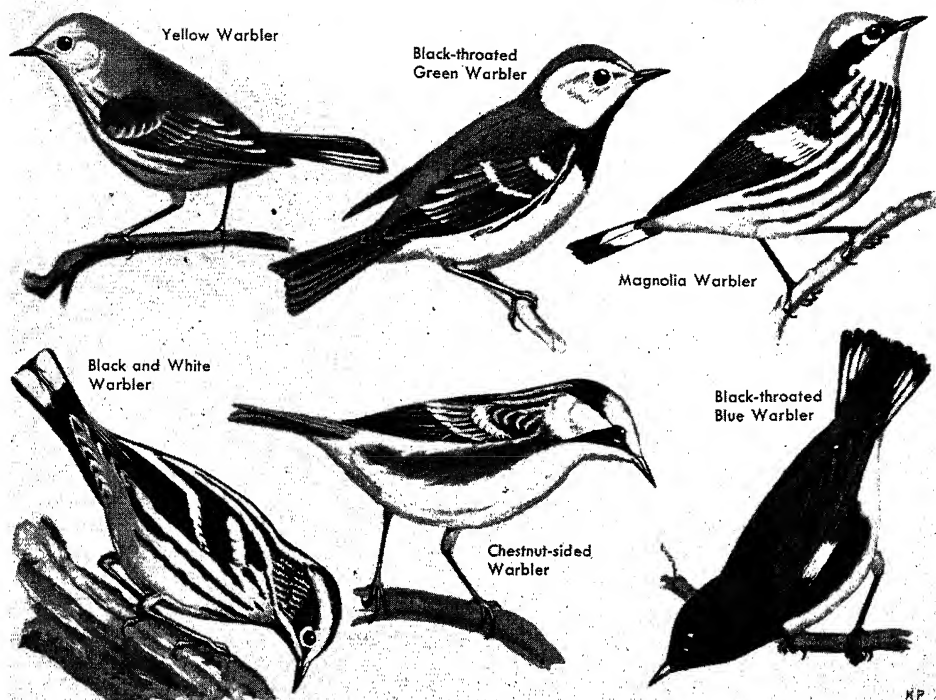
Classification. Warble flies make up the family *Oestridae* in the order *Diptera*. The ox warble flies are *Hypoderma lineata* and *H. Bovis*.

WARBLER is the popular name of the small migratory songbirds of the wood warbler family. They live in the Americas from the tropics to the far north. Most of them are about five and a half inches long. Warblers are hard to see because they are small and they keep close to the foliage of trees and bushes. Their feathers are of many beautiful colors. Their quick, active movements and abrupt, high-pitched songs make the warblers very interesting and delightful to bird lovers.

Many warblers winter in South and Central America, and migrate through the United States late in the spring. In May, they begin to appear in woods, in city parks, and in trees near buildings. Many species go on farther north for their nesting. Some warblers go as far north as the Hudson Bay and the Yukon region but others nest in the Southern States.

Warblers build their nests in trees and bushes or on the ground. The nests are usually cup shaped, and loosely built of twigs and grasses woven together, but some are compact structures of plant down. The female warbler lays from three to six eggs, which are whitish with brownish markings at the larger end.

Many kinds of warblers have fine singing voices. Others sing only weak, lisping notes. There are more than 150 species and subspecies of warblers. Some of



These Are Some of the Best-known Warblers. They delight bird watchers each spring as large flights of them pass

northward on the journey to their nesting grounds, and again in the fall when they migrate south in leisurely groups.

the better-known ones are the *yellow warbler*, the *black-and-white warbler*, and the *myrtle warbler*. Yellow warblers are quite common in city parks. The black-and-white warbler likes to creep along the branches of trees. The myrtle warbler is easy to recognize because it has four yellow patches on its head, rump, and breast.

Another well-known warbler is the *American redstart*. It is colored a striking black with salmon markings, and looks somewhat like a small oriole. The *Blackburnian warbler* has a bright orange throat. Two other warblers are named for their colors. They are the *black-throated green warbler* and the *black-throated blue warbler*. The *ovenbird* has a yellowish-brown stripe on its head, a white breast marked with black, and an olive green back. It builds its ovenlike nest on the ground.

Warblers are very helpful to farmers. They kill harmful insects which destroy fruits and strip trees of their leaves. Their small size allows them to search in tiny cracks in the bark and in fruit buds for insects which might escape larger birds.

A.A.A.

See also BIRD (color plate, Common American Songbirds); CHAT; OVENBIRD; REDSTART; YELLOW THROAT.

Classification. The wood warbler family is the *Parulidae*. The black-and-white warbler is *Mniotilta varia*. The yellow warbler is *Dendroica aestiva*, and the myrtle is *coronata*. The Blackburnian is *D. fusca*, the black-throated green is *D. virens*, and the black-throated blue is *D. caerulescens*. The ovenbird is *Seiurus aurocapillus*.

WARBURTON, PETER EGERTON (1813-1889). See EXPLORATION AND DISCOVERY (Table of Famous Explorers [Australia]).

WAR CORRESPONDENT. Reporting war news is one of the most dramatic jobs in newspaper work. A reporter on a war front must be able to stand any kind of hardship. Often he must travel the same tough road as the soldiers and sailors. He must often go without sleep or food, and run the risk of being killed or wounded.

Perhaps the first efforts to give readers quick and accurate news of a war were made by George W. Kendall, founder of the New Orleans *Picayune*. In 1848 Kendall set up a system of couriers, or messengers, to speed the news of the Mexican War back to the United States. He was able to sell the services of "Kendall's Express" to other papers. During the War between the States, many large city newspapers had correspondents sending their stories by telegraph from the scenes of action. Mathew William Brady first used the camera for reporting during the war. Walt Whitman sent war stories to New York City papers.

Stephen Crane was another great writer to gain fame as a war correspondent. He reported the war between Spain and Cuba in 1896. The first roving war correspondent to become well known was Richard Harding Davis. Beginning with the Spanish-American War, Davis reported the happenings of six major conflicts.

During World War I, newspapers went to great efforts

to supply their readers with the latest war news. Reporters had formerly remained behind the lines, getting their information from commanders, but now they moved with the troops and wrote firsthand accounts. One reporter who became famous as a war correspondent in World War I was Floyd Gibbons of the *Chicago Tribune*. Webb Miller began his successful career for the United Press Associations in this war. Vincent Sheean lived for months behind the Rif lines in Morocco in 1925. His colorful stories of the native revolt against Spain started him in his successful career as a writer.

The work of several correspondents who covered the Spanish Civil War provided examples of good war reporting which kept the American reading public informed. Among the correspondents were Jay Allen of the North American Newspaper Alliance, Herbert Matthews of the *New York Times*, and the famous novelist Ernest Hemingway.

World War II found newsmen in foxholes, aboard ships under fire, and in the crashing debris of bombed cities, getting the news for the people back home. Photographs by wire, overseas radio reports, and motion pictures made this the most thoroughly reported war in history. The United States Marine Corps developed its own soldier-reporters, called combat correspondents.

One of the finest jobs of war reporting was done by Ernie Pyle for the Scripps-Howard papers. Pyle lived with soldiers and sailors on almost every front where Americans fought. His graphic and sympathetic descriptions of men and machines in war endeared him to readers throughout the United States. Pyle was killed by enemy fire on a Pacific island.

The noted columnist and radio commentator, Raymond Clapper, lost his life in a plane crash in the Pacific while covering the war. Other radio war commentators noted for their outstanding reporting included William L. Shiver, Raymond Gram Swing, Robert St. John, Richard Tregaskis, Quentin Reynolds, Walter Duranty, and Robert J. Casey.

Newspaper and motion-picture newsreel photographers worked along with the correspondents, taking many dramatic pictures to show the story of the war. Perhaps the most famous of these was the picture which became the symbol of victory in the Pacific. This Associated Press picture of American troops raising the flag on Iwo Jima was reprinted in almost every newspaper and magazine in the United States. E.L.T.H.

See also CRANE, STEPHEN; DAVIS, RICHARD HARDING; PYLE, "ERNE."

WARD is a word which once had much the same meaning as the word *guard*. The relationship between the two words may be seen in some of the present meanings of *ward*. Two of its meanings are described below.

In law, a ward is a person who needs to be guarded or protected, and so has a guardian appointed for him by a court. Most wards are minors or persons under legal age. Spendthrifts or mentally unsound persons, however, may be legally considered wards. The guardian's duty is to protect the ward's interests and act in the place of a parent (*in loco parentis*) toward the ward.

In politics, a ward is a political division of a city. The early use of this name started when cities were divided into wards so that they might be guarded more easily.

But today cities are divided into wards chiefly to simplify city government and city elections. For purposes of government, each ward elects one or two *aldermen* to help govern the city and to look after the ward. S.T.K.

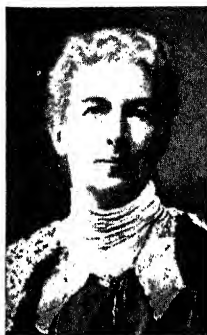
See also ALDERMAN; ATHENS (Ancient City-State [History]); GUARDIAN.

WARD, AARON MONTGOMERY. See ILLINOIS (Famous Illinois Men and Women).

WARD, ARTEMUS. See BROWNE, CHARLES FARRAR.
WARD, CHRISTOPHER LONGSTRETH (1868-1943). See DELAWARE (Arts and Crafts).

WARD, ELIZABETH STUART, PHELPS (1844-1911), was an American writer and social reformer. She was born in Boston. Most of her writings are short stories and novels. Her particular interest was temperance reform.

WARD, HUMPHRY, MRS. (1851-1920), was an English novelist and social reformer. She was perhaps best



BROWN TRUST.

Mrs. Humphry Ward, popular British novelist of the late 1800's

known for her translation of Henri Frédéric Amiel's *Journal Intime* from the French, and for her novel, *Robert Elsmere*. The novel became world-famous after it was unfavorably criticized by William Gladstone, the British Prime Minister. Mrs. Ward (Mary Augusta Arnold) was born at Hobart, Tasmania, in Australia. Her grandfather was Thomas Arnold, headmaster of Rugby, and her uncle was Matthew Arnold, the famous author. L.J.

WARD, JOHN QUINCY ADAMS (1830-1910), was an American sculptor whose works are noted for their strength and simplicity. He was born in Urbana, Ohio. Ward studied art in Brooklyn, N.Y., under Henry Kirke Brown, and also in Washington, D.C., and New York City. In the 1850's he made portrait busts of many great Americans. In 1865 his statuette "The Freedman" became so popular that thousands of copies of it were sold. F.Ho.

His Works include "The Good Samaritan," and statues of William Shakespeare and George Washington.

WARD, LESTER FRANK (1841-1913), was an American sociologist and geologist. He was born in Joliet, Ill., and was educated at George Washington University. He became a geologist and paleontologist for the Federal government. In 1906 he went to Brown University as professor of sociology. G.L.F.

His Works include *Dynamic Sociology*; *Outlines of Sociology*; and *Psychic Factors of Civilization*.

WARD, LYND KENDALL (1905-), is an American artist. He is famous for his striking woodcuts. Ward illustrated more than a hundred books. He was born in Chicago. He attended Teachers College at Columbia University, and the Academy of Graphic Arts in Leipzig, Germany. He illustrated many books for children which his wife, May McNeer, wrote. They include *Prince Bantam*; *Waif Maid*; and *Stop Tim*. Ward's novels in woodcuts include *God's Man*; *Mad Man's Drum*; *Song without Words*; and *Vertigo*. H.B.O.

WARD-BELMONT SCHOOL is a junior college for women in Belmont Heights, Nashville, Tenn. It offers a college preparatory program and liberal arts courses, as well as training in art, speech, dancing, music, and physical education. Ward's Seminary, founded in 1865, and Belmont College, founded in 1890, were combined in 1913 under the present name. The school's average enrollment is about 500.

WAR DEBT. After World War I, the Allied nations were left with many problems. The question of war debts was one of the most difficult problems to solve. The great expenses of the war had forced various countries to borrow money from other countries that were wealthier. The money was used to buy munitions and food, and to support the great armies which were fighting against Germany. About twenty countries took part in the borrowing and lending. The sums of money that had been lent came to be known as *inter-Allied debts*. After the war ended, the question arose: how shall the war debts be paid?

The United States was the chief lending country during the war. It was the country least touched by the war, and the one best able to give money to poorer countries and to countries where actual fighting took place. Loans of more than \$10,000,000,000 were made to about twenty countries. Great Britain borrowed more than \$4,000,000,000 from the United States, and lent a great deal of money to more needy nations. No one questioned the need of the loans during the difficult period of the war. Nothing was said about when the money would be paid back. When the Allies triumphed over Germany, the problems of peace took first place in discussions. But finally, in 1922, the question of war debts came up for consideration.

Great Britain Asks Cancellation of Debts. During the Peace Conference, the British Government had suggested that all inter-Allied war debts should be canceled. The British argued that such a generous act would do much to bring good will and peace to the world. Great Britain pointed out that if all debts were erased, they would cancel each other and no one country would suffer any great loss.

But the United States did not agree to the British proposal. Secretary of the Treasury Andrew Mellon argued that the United States had lent most of the money and was entitled to repayment. He said that such a cancellation of the war debts would not amount to an equal loss on the part of all countries concerned, but would be mainly a contribution from the United States.

War Debt Commission. In 1922 the United States Congress organized the World War Foreign Debt Commission. The purpose of the commission was to reach a separate settlement with each country which owed money to the United States. By 1930 the commission had made agreements with all the countries except the Soviet Union, Armenia, and Nicaragua. Cuba and Liberia had paid their small debts in full.

Settlement of the Largest Debts. Great Britain was the first country to make arrangements for paying back the money it had borrowed from the United States. The settlement was reached late in 1923. In August, 1925, Belgian representatives met in Washington, D.C., with

the War Debt Commission, and reached an agreement concerning the payment of the two loans the United States had made to Belgium.

In 1925 French representatives met with the War Debt Commission and proposed terms for paying the French debt. The United States commissioners refused the French terms. In 1926 terms were finally agreed upon. The French Chamber of Deputies and Senate did not approve the arrangement for paying back the loan until 1929. Later in the same year the United States Congress also ratified the agreement. The Fascist government of Italy at first showed little interest in discussing the country's war debts. But in November, 1925, an Italian debt commission finally came to the United States. The terms given to Italy were better than those given to any other debtor nation.

Smaller European Countries. The United States reached a debt settlement with Finland in 1923. In 1924 agreements were made with Hungary, Lithuania, and Poland. The United States came to terms with Czechoslovakia, Estonia, Latvia, and Rumania in 1925. Yugoslavia completed arrangements for a settlement in 1926, Greece in 1929, and Austria in 1930. The United States tried to make all settlements in accordance with each nation's ability to pay. The usual rate of interest on the loans was 3.3 per cent.

Summary. During four years' activity, the War Debt Commission reached agreements with the following countries for payment of the sums shown in the table below.

COUNTRY	DEBT
Austria	\$ 24,615,000
Belgium	347,251,013
Czechoslovakia	115,000,000
Estonia	13,830,000
Finland	9,000,000
France	2,933,516,448
Great Britain	4,135,818,358
Greece	30,292,000
Hungary	1,939,000
Italy	2,042,199,466
Latvia	5,775,000
Lithuania	6,030,000
Poland	178,560,000
Rumania	44,591,000
Russia	187,729,750
Yugoslavia	62,850,000
Total	\$10,138,997,035

German Reparations. The Treaty of Versailles held Germany responsible for the losses suffered by Allied nations during World War I. In 1921 a commission of Allied experts ordered Germany to pay damages of about \$33,000,000,000. These damage payments were known as reparations. Some payments were to be made in money, and some were to be made in goods.

Germany paid a few installments of its debt, but soon claimed that the payments were wrecking its economic system. In 1925, an international committee headed by Charles G. Dawes worked out a plan of payments and loans to Germany to ease the financial strain upon that country. Nevertheless Germany insisted upon a reduction in its payments. In 1929 an international commission of financial experts met in Paris to discuss the question of German reparations. The outcome of the discussions was the Young Plan. This plan reduced the

German debt to about \$26,000,000,000 and made payments easier. A Bank for International Settlements was set up to handle payments.

In August, 1929, a conference of international delegates met at The Hague, the capital of The Netherlands, to discuss the Young Plan and the whole problem of reparations. After slight revisions, the Young Plan was adopted early in 1930.

Meanwhile, world-wide inflation and uncontrolled spending had led to a world-wide financial panic and depression. The panic threatened to bring on Germany's complete financial collapse. Such a collapse would have extended its effects to many other countries. The Young Plan was doomed to the failure it finally met because the war debt payments it set up did not represent a corresponding transfer of goods. Without such a transfer, there was no way to create the credits out of which the payments could be made.

The Hoover Moratorium. On June 30, 1931, President Herbert Hoover proposed that all intergovernmental debts be held up for one year. This action was later known as the Hoover Moratorium. It was intended to provide a "breathing spell" for Germany and the other countries of Europe. Germany took the opportunity to ask for a complete adjustment of all war debts.

The Lausanne Conference. In June, 1932, an international conference met at Lausanne, Switzerland. An agreement was reached in July which canceled all German reparations until better conditions returned to Germany.

Later, Great Britain and France asked that all debts be postponed or completely eliminated. The United States did not agree to this plan, but almost all debtor nations held up their payments to America.

The world-wide depression had dealt a deathblow to the whole question of government debts. On June 15, 1933, debt payments to the United States amounted to only about 8 per cent of the total amount due. Great Britain and Italy made very small payments, and seven countries paid nothing. Only Finland made a full payment. The total collapse of the war debt agreements occurred in 1934. On June 15, the total payments due America amounted to \$477,843,644. The United States received only \$166,538, which was paid by Finland. Until 1940, Finland was the only country which made regular yearly payments on its war debt.

During World War II, the United States was again the great financial power of the world. The Lend-Lease Act of 1941 took the place of the huge lending system of World War I. Under the terms of the act the United States gave goods and materials to all nations fighting the Axis Powers. The object was to defeat the Nazi tyranny at any cost. The problem of repayment was to be solved after victory in such a way as to promote world trade and prosperity. After World War II ended, the United States canceled some war debts outright. Other war debts and the problem of reparations were discussed at meetings of the Allied Powers. D.E.L.

See also GENOA CONFERENCE; INTERNATIONAL SETTLEMENTS, BANK FOR; LEND-LEASE.

WARDEN. See PRISON.

WAR DEPARTMENT. This Department formerly was an executive branch of the Government of the United

States. It had control over the army. Until 1798 it also supervised the navy. The War Department was created by an act of Congress in 1789, and its duties were transferred to the new Department of the Army by the National Security Act of 1947. This act created the National Military Establishment, an executive Department with three divisions: the Department of the Army, the Department of the Navy, and the Department of the Air Force.

During the history of the War Department, many famous men held the office of Secretary of War. Some of the best known included Henry Knox, Henry Dearborn, James Monroe, William H. Crawford, Lewis Cass, William L. Marcy, Jefferson Davis, Edwin M. Stanton, Elihu Root, William Howard Taft, Newton D. Baker, and Henry L. Stimson. Baker was Secretary during World War I, and Stimson during World War II.

The Secretary of War was the third highest ranking member of the President's Cabinet. He was appointed by the President with the consent of the Senate.

The Secretary had an Under Secretary and two Assistant Secretaries on his staff. The Chief of Staff was in charge of army affairs.

The main divisions of the War Department included the War Department General Staff, the Army Service Forces, the Army Ground Forces, the Army Air Forces, and the Joint Army-Navy Boards.

See also ARMY, DEPARTMENT OF THE; NAVY, DEPARTMENT OF THE.

WAR EAGLE. See EAGLE.

WAREHOUSE. A storage place for goods and merchandise is called a warehouse. It is usually a large, well-constructed, fireproof building or series of buildings. Storing goods in such places is called *warehousing*.

Warehousing forms an important link in the chain of distribution between the manufacturer or importer and the consumer. Large shipments of goods which cannot be turned over immediately for sale to small merchants are stored in warehouses and drawn out as needed. This method regulates the distribution of goods and equalizes supply with demand. The prices of goods would rise and fall out of proportion to their value if all supplies were dumped on the market at the same time.

The modern form of warehousing began in the Middle Ages. Valuable shipments of goods were received in Europe from the Far East and other places. These shipments had to be protected from theft and the weather until they could be disposed of to local merchants.

In the United States, warehouses were first used during colonial times. Shipments of goods received from Europe were stored in large buildings in the cities along the eastern seacoast. The need of storage places increased with the expansion of the railroads. More goods were carried than could be disposed of immediately, and the railroads took over the job of providing freight depots and grain elevators for storage. But in 1906 the service of warehousing was separated from the transportation system by the Hepburn Act.

Since that time, warehousing itself has become an independent industry. The owners of warehouses make a profit from renting storage space and performing other services for large industries and their retail customers. The Federal Warehouse Act of 1916, and other laws

enacted by most states, govern the practices of warehousing. These laws make the warehouse owner responsible for the condition of the stored goods, provide for inspection, and regulate the issuance of warehouse receipts which are often used as security for loans.

Another type of warehouse is that controlled by large department stores, chain stores, and manufacturers. These warehouses are usually located near manufacturing or agricultural centers. They have branch, or field, warehouses located in various parts of the country to permit rapid, cheap distribution to retail stores. J.H.F.

See also BONDED WAREHOUSE.

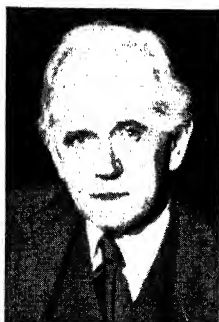
WARFARE, AMPHIBIOUS. See AMPHIBIOUS WARFARE.

WARFARE, CHEMICAL. See CHEMICAL WARFARE.

WARFIELD, DAVID (1866-), is an American actor who became famous for playing the parts of kindly old men who were always odd, but also pathetic, noble, and brave. Warfield gained his first fame as Simon Levy in *The Auctioneer* and as the old musician, Von Barwig, in *The Music Master*. He moved audiences to tears and to laughter by acting that many critics considered perfect in its simplicity.

Warfield was born in San Francisco, and first appeared on the stage in a theater there. B.M.

His Roles also included leading parts in *The Return of Peter Grimm*; *A Grand Army Man*; and *The Merchant of Venice*.



Brown Bros.
David Warfield was a popular American stage star.

WAR FOOD ADMINISTRATION. See AGRICULTURE, DEPARTMENT OF.

WAR LABOR BOARD, NATIONAL. See ARBITRATION; INDUSTRIAL RELATIONS.

WAR MANPOWER COMMISSION. See LABOR, DEPARTMENT OF; WORLD WAR II (A Democracy in Action).

WARM SPRINGS. See VIRGINIA (Caverns and Springs).

WARM SPRINGS FOUNDATION is an institution at Warm Springs, Ga., for the treatment of victims of poliomyelitis (infantile paralysis). The temperature of the water at Warm Springs is always 89 degrees Fahrenheit. This warm water is used as part of the treatment for poliomyelitis. It gushes from a source almost a mile below the top of Pine Mountain and flows at the rate of 800 gallons a minute. The Indians knew of this place and it is said that warriors came here to wash their wounded bodies in the warm waters and soft mud. The place was already a popular summer resort in 1832. During the 1880's and 1890's, it was a fashionable Southern watering place and health center. It became nationally famous after Franklin D. Roosevelt's visits there.

Roosevelt came to the resort after an attack of infantile paralysis in 1921, and again in 1925. The great help he received made him want to share the benefits of Warm Springs with other polio sufferers. In 1927 he organized the Warm Springs Foundation as a nonprofit corporation. His own Georgia home, located near the

Foundation buildings, later came to be known as the Little White House. Franklin D. Roosevelt died here in 1945, and two years later his home was given to the people of Georgia as a shrine.

Roosevelt set up a special fund for patients who are unable to pay all or part of the cost of treatment. The Foundation buildings have been donated by various groups and individuals. The institution owns 2,200 acres of pine and oak forests around the central buildings. The Foundation is affiliated with the Piedmont Hospital in Atlanta, which provides general hospital services and facilities. There are two large outdoor public swimming pools which are fed by warm spring water.

The Foundation also has an infirmary, dormitories, graded walks, and a special theater. The attendants are trained in orthopedics and physiotherapy.

People of the entire country help support infantile paralysis work at Warm Springs Foundation by their contributions to the March of Dimes campaign each January, and through benefit balls. W.R.LAP.

See also INFANTILE PARALYSIS.

WARNER, CHARLES DUDLEY (1829-1900), was an American editor, novelist, and essayist. His essays deal with recollections of his boyhood days, literary criticism, and travel. His novels include *The Gilded Age*, written with Mark Twain. Warner was born at Plainfield, Mass., and was graduated from Hamilton College. From 1861 until his death, he was associate editor of the Hartford (Conn.) *Courant*. C.M.E.

His Works include *My Summer in a Garden* and *As We Were Saying*.

WARNER, SETH (1743-1784), was an American soldier in the Revolutionary War. He was born in Roxbury, Conn., but at twenty moved to Bennington, Vt. Here he and Ethan Allen became leaders of the Green Moun-

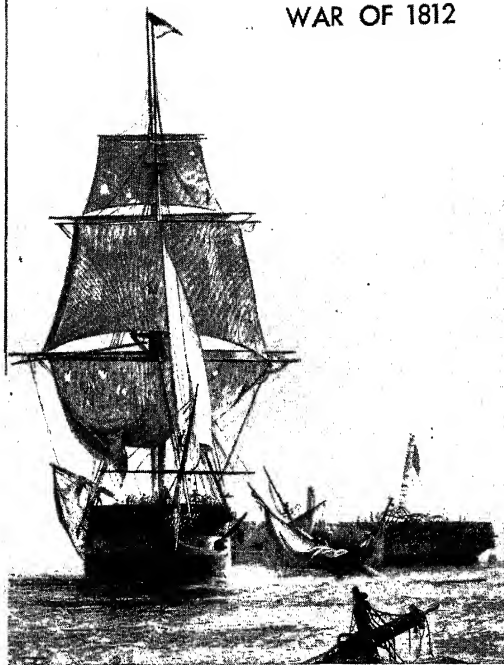


National Life Insurance Co.
Seth Warner and His Men holding off the British in a battle near Hubbardton, Vt., on July 7, 1777

tain Boys. In 1775 Warner was elected lieutenant colonel of this group, and later was appointed colonel of a regiment in the Continental Army. He took part in the capture of Crown Point, in the Richard Montgomery expedition into Canada, and in the battles of Hubbardton and Bennington. Warner was later appointed a brigadier general. See also GREEN MOUNTAIN BOYS. N.G.G.

WAR OF 1812

WAR OF 1812



Chicago Historical Society

WAR OF 1812. The War of 1812 was in many ways the strangest war in United States history. It could well be named the War of Faulty Communication. Two days before war was declared the British Government had stated that it would repeal the laws which were the chief excuse for fighting. If there had been telegraphic communication with Europe, the war might well have been avoided. Speedy communication would also have prevented the greatest battle of the war, which was fought fifteen days after a treaty of peace had been signed.

It is strange also that the war for freedom of the seas began with the invasion of Canada, and that the treaty of peace which ended the war settled none of the issues over which it had supposedly been fought.

The chief United States complaint against the British was interference with shipping. But New England, the great shipping section of the United States, bitterly opposed the idea of going to war. The demand for war came chiefly from the West and South, although these sections were only slightly affected by British naval policy.

When we add that both sides claimed victory in the War of 1812, it becomes clear that the whole struggle was a confused mass of contradictions. These must be explained and cleared up before we can understand why the democratic United States sided with Napoleon, the dictator of France, in a great struggle for world power.

Causes of the War

Napoleon Bonaparte, head of the French Government after 1799 and Emperor after 1804, had made himself the master of continental Europe. Except for one short breathing spell (1801-1803), Great Britain had been fighting France since 1793. Napoleon had long

hoped to invade and conquer Britain, but in 1805 his navy was destroyed at the battle of Trafalgar. This forced Napoleon to give up the idea of taking an army across the English Channel. So he set out instead to ruin Great Britain by destroying British trade. Napoleon's Berlin and Milan Decrees (1806-1807) were an attempt to shut off Great Britain from all trade with Europe. (See CONTINENTAL SYSTEM; MILAN DECREE.) Great Britain, in turn, issued a series of Orders in Council which declared a blockade of French ports and of ports under French control. See ORDER IN COUNCIL.

Neither Napoleon nor the British Government intended that these measures should injure the United States. But the British and French blockades had disastrous effects on United States shipping. Before 1806 the United States was getting rich on the European war. United States ships took goods to both Great Britain and France, and the value of trade carried increased fourfold from 1791 to 1805. Now the picture had suddenly changed. A United States ship bound for French ports had to stop first at a British port for inspection and payment of fees. Otherwise the British were likely to seize the ship. But Napoleon ordered neutral ships not to stop at British ports for inspection, and announced that he would seize any United States ships which obeyed the British order.

The British navy controlled the seas. So the easiest thing for United States vessels was to trade only with other neutrals and with Great Britain. A few adventurous spirits ran the British blockade for the sake of huge profits they could make, and continued the risky trade with continental Europe. The United States complained of both French and British policies as illegal "paper blockades," since neither side could really enforce such an extensive blockade. See BLOCKADE (Paper Blockade).

Impressment of Seamen. The British navy was always in need of seamen. One reason for this need was that hundreds of deserters from the British navy had found work on United States ships. The British Government claimed the right to stop neutral ships on the high seas, remove sailors of British birth, and impress, or force, them back into British naval service. The United States objected strongly to this practice, partly because many native-born Americans were impressed "by mistake," along with British seamen. See JEFFERSON, THOMAS (Administration as President [The Struggle for Neutrality]).

In June, 1807, the captain of the United States frigate *Chesapeake* refused to let the British search his ship for deserters. The British frigate *Leopard* fired on the *Chesapeake*, removed four men whom the British called deserters, and hanged one of them. Anti-British feeling in the United States rose sharply. President Thomas Jefferson ordered all British naval vessels out of American harbors. Four years later, the British apologized for the incident and paid for the damage done, but the bitterness remained.

American Reaction. The United States tried several times to get the British to change their policy toward neutral shipping and toward impressment. In April, 1806, the United States Congress passed a Non-Importation Act, which shut out British goods from American markets. The Act was not enforced until November,

and was followed by other Acts. But all American efforts to change British policy failed. In December, 1807, Congress passed the Embargo Act. This act closed United States ports to all foreign ships, and forbade American ships to sail for any but other home ports. For a fuller description of the effect of the Non-Importation Act on United States trade, see JEFFERSON, THOMAS (Administration as President [The Embargo]).

The embargo did not hurt the British or the French a great deal. But it almost ruined New England shipping interests because it cut off their chief markets and ports of call. It also hurt Southern planters, who normally sold tobacco, rice, and cotton to Great Britain. The opponents of the Act described its effects by spelling the word backward and calling the Embargo the "O-Grab-Me" Act. After fifteen months, the embargo was repealed and United States ports were reopened to all foreign trade except that with France and Great Britain.

In 1810 a curious law known as "Macon's Bill No. 2", or the Macon Act, removed all restrictions on trade. But the law stated that if either Great Britain or France should give up its orders or decrees, the United States would stop trading with the other nation unless it, too, changed its policy.

Macon's Bill really helped Napoleon, who was eager to get the United States into the war against Great Britain. He pretended to repeal his Berlin and Milan Decrees so far as they applied to United States ships. President James Madison at once shut off all trade with Great Britain. In the summer of 1811 further attempts were made to reach an agreement with the British. But these attempts failed, and in November, Madison advised Congress to get ready for war.

The Warhawks. The Congress was led by a group of young men known as "Warhawks." Henry Clay of Kentucky and John C. Calhoun of South Carolina were probably the best-known of the group. Most of the Warhawks came from the West and the South, where the cry for war with Great Britain was loudest.

The people of New England generally opposed going to war, because war with Great Britain would wipe out entirely the New England shipping trade which had already been heavily damaged. Another reason New England opposed war was because many New Englanders sympathized with Great Britain in its struggle against the dictator Napoleon.

Many historians believe that a leading motive of the Warhawks was a desire for expansion. The people of the Northwest were meeting armed resistance in their attempt to take more land from the Indians, and they believed that the Indians were enjoying British support. An American army was attacked by Indians at the Battle of Tippecanoe in the Wabash Valley in November, 1811, and British guns were found on the battlefield. The Westerners, therefore, were anxious to drive the British out of Canada. Southerners looked longingly at Florida, which belonged to Great Britain's ally, Spain. The South had also suffered a serious loss of markets. But the deciding motive for war seems to have been desire for territory.

Progress of the War

Declaration of War. On June 1, 1812, President Madi-

son asked Congress to declare war against Great Britain. He gave as his reasons the impressment of United States seamen and the interference with United States trade. He charged also that the British had stirred up Indian warfare in the Northwest. Congress declared war on June 18, 1812. Two days earlier, the British Foreign Minister had announced that the Orders in Council would be repealed, but word of this announcement did not reach America until much later, after the war had already begun.

Attitude of the Nation. Congress had known for seven months that war was likely to come, but no real preparations had been made. There was little money in the Treasury. The regular army had only about 10,000 troops, and very few trained officers. The navy had fewer than twenty seagoing ships.

To make matters worse, a large minority, both in Congress and in the country, was opposed to war. The declaration of war had passed by a vote of only 79 to 49 in the House, and 19 to 13 in the Senate. New England, the richest section in the country, bitterly opposed the war, and interfered with its progress by withholding both money and troops.

The War at Sea. The position of the United States on the oceans was hopeless from first to last. Great Britain had more than a hundred battleships, while the United States had not a single vessel of that class. The seventeen frigates and sloops of war that made up the United States Navy were competing against nearly a thousand British fighting ships. Now and then an American vessel won a brilliant victory over a single British ship, but the British navy ruled the waves.

A British blockade was clamped on the United States coast, and United States trade almost disappeared. Because duties on imports were the chief source of Federal revenue, the Treasury drifted further and further into debt.

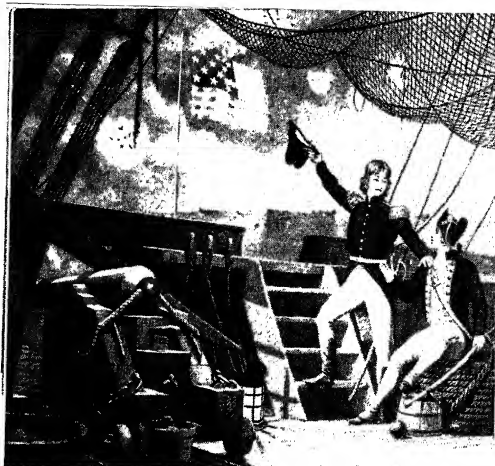
The only American naval victories that directly affected the course of the war were those won by Oliver Hazard Perry on Lake Erie, on September 10, 1813, and by Thomas Macdonough on Lake Champlain, on September 11, 1814. But United States naval vessels and privateers did some damage to British commerce, taking about 1,500 prize ships in all.

Land Campaign of 1812. The American plan of attack called for a three-way invasion of Canada. Invasion forces were to start from Detroit, from the Niagara River, and from the foot of Lake Champlain.

At Detroit, General William Hull led about 2,000 troops across the Detroit River into Canada. The British commander, General Sir Isaac Brock, drove Hull's forces back into Detroit, surrounded them, and captured both the city and Hull's entire army. British and Indians also captured Michilimackinac and Fort Dearborn (Chicago).

On the Niagara River, a United States force occupied Queenstown Heights on the Canadian side. This force was defeated and captured when New York militia units refused to come to its support.

At Lake Champlain, the third United States army advanced from Plattsburg, N.Y., to the Canadian frontier. Here, too, the militia refused to leave United States territory, and the army marched back again to Platts-



Joseph Boggs Beale, Modern Enterprises

The War of 1812 gave birth to the American national anthem, "The Star-Spangled Banner." Francis Scott Key was inspired to write the verses when, "by the dawn's early light," he saw the American flag still flying over Fort McHenry after an all-night bombardment by a British naval squadron.

burg. Thus the first attempt to invade Canada failed completely.

Campaigns of 1813. In January, 1813, an American army advancing toward Detroit was defeated and captured at Frenchtown on the Raisin River. In April, York (now Toronto), the capital of Upper Canada, was captured by United States troops and held for a short time. Some of the public buildings were burned.

Commodore Perry's destruction of the British fleet on Lake Erie forced the British to pull out of Detroit, and much of Michigan Territory came under United States control. General William Henry Harrison was able to take his army across the lake and defeat the retreating British at the Battle of the Thames.

In the autumn, General James Wilkinson and General Wade Hampton undertook a campaign against Montreal. This attempt ended in failure, and the United States armies retreated into northern New York. In December the British crossed the Niagara River, captured Fort Niagara, and burned Buffalo and neighboring villages.

Campaigns of 1814. By 1814 Napoleon had been defeated in Europe. Great Britain was then able to send 18,000 veteran troops to Canada, thus ending all American hopes of conquest. But the United States had at last built up a well trained and disciplined army on the New York frontier. Under the able leadership of Major General Jacob Brown and Brigadier General Winfield Scott, this army crossed the Niagara River from Buffalo in July and defeated the British at the Battle of Chippewa. But soon after that the Americans were turned back at the Battle of Lundy's Lane. After holding Fort Erie in Canada for several months, the United States troops finally withdrew to the American side. This was the last attempt to invade Canada. Meanwhile, 11,000 British troops had moved into New York by way of Lake Champlain. They retreated hastily when the destruction of the British fleet on the lake injured their supply lines back to Canada.

Another British army, under General Robert Ross, was escorted by a fleet to Chesapeake Bay, scattered the

WAR OF 1812

United States troops at the Battle of Bladensburg, occupied Washington, D.C., and burned the Capitol and other public buildings. Both the British army and the British fleet were driven back before Baltimore, Md. This engagement inspired Francis Scott Key to write "The Star-Spangled Banner."

The Needless Battle. The Battle of New Orleans was the last battle of the war. It was fought on January 8, 1815. Like the declaration of war, this battle might have been prevented if there had been speedy communication. A treaty of peace had been signed at Ghent, Belgium, fifteen days before the battle took place.

The British had sent an army of more than 8,000 men to capture New Orleans. There were several possible routes to the city, but the British chose to march straight toward the entrenchments that had been prepared by General Andrew Jackson. American artillery and sharp-shooting riflemen from the backwoods mowed down about 2,000 British soldiers, including the commanding officer, General Sir Edward Pakenham. The Americans lost few men.

Treaty of Ghent. The British public was tired of war and especially of war taxes. The British Government therefore proposed a meeting to discuss terms. Commissioners of the two countries met at Ghent, Belgium, in August, 1814.

The British at first insisted that the United States should give up certain territory on the northern frontier, and set up a large permanent Indian reservation in the Northwest. But American victories in the summer and fall of 1814 led the British to drop these demands. A treaty was finally signed on December 24, 1814, in Ghent, Belgium. By its terms, all land which had been captured by either party was to be given up. Everything was to be exactly as it was before the war, and commissions from both countries were to settle any disputed points about boundaries. Nothing whatever was said about impressments, blockades, or the British Orders in Council, which supposedly had caused the war in the first place.

Results of the War

One important result of the War of 1812 was the rapid rise of manufacturing in the United States. During the war, United States citizens were unable to import goods from Great Britain, and had to begin making many articles for themselves. The war also increased national patriotism, and helped to unite the United States into one nation.

The war settled none of the issues over which the United States had fought. But most of these issues faded out during the following years. In the long period of peace after 1815, the British had no occasion to make use of impressments or blockades. Indian troubles in the Northwest were practically ended by the death of the chief Tecumseh and by the British surrender of Detroit and other posts. The United States occupied part of Florida during the war, and was soon able to buy the rest of it from Spain.

One indirect result of the War of 1812 was the later election to the Presidency of Andrew Jackson and of William Henry Harrison. Both of these men won military fame which had a great deal to do with their elections.



Chicago Historical Society

Commodore Perry Leaves His Sinking Ship and is rowed to another vessel. There he continued to direct his fleet in the

Battle of Lake Erie. By defeating the British squadron, Perry gained control of the lower end of the Great Lakes.



Chicago Historical Society

The Battle of New Orleans was the last engagement of the War of 1812. Neither the victorious Americans nor the

British knew that a peace treaty had been signed at Ghent, Belgium, fifteen days before the battle was fought.

Chief Battles of the War

The War of 1812 was not an all-out struggle on either side. For the British, the war was just an annoying part of their struggle with Napoleon. For many Americans, it was an unjustified attempt to gratify the expansionist ambitions of the South and West.

The chief battles of the war are described below.

Lake Champlain (September 11, 1814). The British had four ships and about a dozen rowing galleys on Lake Champlain to protect the flank of General Sir George Prevost's army. Prevost was advancing against Plattsburg on the west shore of the lake. Master-Commandant Thomas Macdonough commanded the American fleet of four ships and ten rowing galleys. Macdonough anchored his ships across the mouth of Plattsburg Bay, so that the British had to approach him head on. He also arranged the anchors and cables of his flagship, the *Saratoga*, so that he could turn the ship about to bring a fresh broadside to bear on the enemy at a critical point in the fighting. The result of Macdonough's careful planning was the surrender of the entire British fleet.

Lake Erie (September 10, 1813). At Erie, Pa., Master-Commandant Oliver Hazard Perry had built two fine brigs, each carrying twenty guns. In addition, he had under his command a smaller brig captured from the British, and six small schooners, each armed with one or two heavy guns. With these nine ships, Perry blockaded the British fleet of six ships at the western end of the lake. The British came out to fight, and at first had the advantage. When Perry's flagship, the *Lawrence*, was disabled, he transferred in a small boat to the *Niagara*, which had suffered little damage. He went on to defeat the British fleet and capture it. Perry reported his victory to General Harrison in the famous words, "We have met the enemy and they are ours."

Lundy's Lane (July 25, 1814). This battle took place on Canadian soil, about a mile from Niagara Falls. The battle began when General Winfield Scott was advancing toward Queenston with a force of about 1,300 men and came upon about 2,800 British troops. The American General Jacob Brown had some 2,700 men at Chippewa, a few miles away. The fighting began at about five o'clock in the afternoon, and before darkness fell General Brown had arrived on the field with reinforcements. The battle raged until midnight, and the losses were heavy.

Each side claimed victory in the battle. The Americans drove the British from their position and captured the chief British battery, but the British later retook the field and recaptured the guns. Lundy's Lane is remembered for brave and stubborn fighting on both sides.

New Orleans (January 8, 1815). This battle has already been described under the heading *The Needless Battle*. It had no effect on the outcome of the war, but it gave the United States Government some political standing in Europe, and brought great fame to General Jackson.

Queenston Heights (October 13, 1812). This battle ended the second American attempt to invade Canada. General Sir Isaac Brock, the British commander, had about 1,500 men scattered along thirty-six miles of the Niagara River. The Americans, under Generals Stephen Van Rensselaer and Alexander Smyth, numbered more than 6,000. The Americans tried to cross the Niagara River from a point opposite Queenston Heights, seven miles below the Falls. About 400 Americans got across the river, and were attacked by a force under General Brock. Brock was fatally wounded in the battle.

Later in the day, after both sides had received reinforcements, the British drove the invaders down to the bank of the river. Here the United States troops stopped, because they could not get back across the stream. The entire American force of about 900 surrendered. The British victory was clouded by the death of General Brock, who was one of the finest officers in either army.

A monument to his memory stands on the battlefield. See BROCK, ISAAC, SIR.

Raisin River Massacre (January 22, 1813) took place at Frenchtown (now Monroe, Mich.) on the Raisin River. A detachment of Kentucky troops, sent to drive the British from Frenchtown, was defeated and captured by the British and Indians. After the battle the British departed with the able-bodied American prisoners, leaving the wounded Americans behind with the Indians. The Indians massacred the American prisoners.

Thames River (October 5, 1813), also known as the BATTLE OF MORAVIANTOWN. This battle was the direct result of Perry's naval victory on Lake Erie. The British had to abandon Detroit. British troops withdrew from Detroit and crossed into Canada. The British were accompanied by 600 Indians under their chief, Tecumseh. After the British had entered Canada, about 3,000 United States troops under General Harrison pursued them for several days.

The British finally halted at Moraviantown, on the Thames River in Kent County, Ontario, and offered battle. Colonel Proctor and many of his men fled soon after the first volley, but Tecumseh fell fighting on the battlefield. On the following day, the Americans burned Moraviantown, which was the home of the Moravian Indians. The death of Tecumseh, the leading Indian chief, broke the league of Indian tribes which had been allied to the British and practically ended the co-operation of the British and Indians on the northwestern frontier. A court-martial later publicly reprimanded Colonel Proctor and suspended him from his rank. J.W.P.

Related Subjects. The reader is also referred to:

BIOGRAPHIES

Harrison, William Henry	Lawrence, James
(As Army Commander)	Macdonough, Thomas
Hull, Isaac	Pakenham, Edward M., Sir
Jackson, Andrew (The Soldier)	Perry, Matthew C., and Oliver H.
Key, Francis Scott	

UNCLASSIFIED

Constitution, The	Hartford Convention
Ghent, Treaty of	Non-Intercourse Act

Questions

Why might the War of 1812 be called the War of Faulty Communication?

What were the Milan Decrees? The Orders in Council? Why were these measures declared?

What was *impressment*? Why did Americans object to it?

Who were the Warhawks? Why did they favor war with Great Britain?

What two American naval victories affected the course of the war?

When and by whom were these historic words uttered: "We have met the enemy and they are ours"?

When was the American Capitol burned by the British?

What famous American patriotic song was written during the battle off Baltimore?

What battle of this war is known as the "Needless Battle"? Why?

WAR OF SECESSION. See WAR BETWEEN THE STATES.

WAR OF THE GRAND ALLIANCE. See FRENCH AND INDIAN WARS (King William's War).

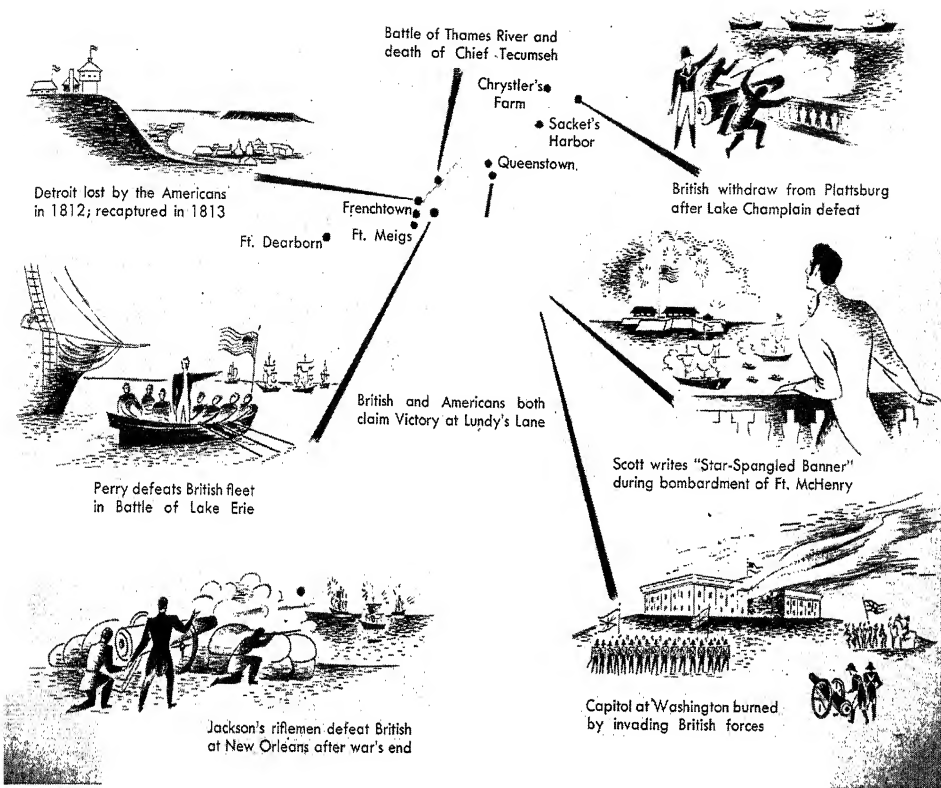
WAR OF THE NORTH. See CHARLES (XII, Sweden).

WARP. See CLOTH; WEAVING.

WAR PRODUCTION BOARD. See WORLD WAR II (A Democracy in Action).

WARRANT, WOR ant. A warrant is a document issued by a justice of the peace or some other magistrate.

THE WAR OF 1812



It is directed to a constable or sheriff, and gives him the authority to perform a certain act which would be illegal without the warrant. Warrants are most commonly used to authorize the arrest of a person accused of a crime. There are various kinds of warrants. A *bench warrant* is a writ issued by the court itself which authorizes the proper officer to arrest a person charged with a crime, misdemeanor, or contempt of court, and to bring him before the court. A *search warrant* is a writ which authorizes a certain officer, either named or described, to search a house or other premises for goods held contrary to law. See also ARREST; SEARCH WARRANT. H.CAL.

WARRANT OFFICER is the rating given to specialists in the United States Army and Navy who have risen to a rank just below a naval ensign or an army second lieutenant. Naval warrant officers are specialists in gunnery, radio, and other similar special fields but are not qualified for general duties, except a chief boatswain, who may be assigned command of small service craft. A warrant officer enjoys the same privileges as a commissioned officer. R.COL.

WARRANTY. See DEED.

WARREN is a piece of land for the enclosing and raising of rabbits or other small animals. In England, during the Middle Ages, *free warrens* were set up by the kings for hunting by noblemen.

WARREN, Ohio (population 43,837). This steel-mak-

ing center lies in the upper part of the Mahoning Valley of northeastern Ohio. Warren is fourteen miles northwest of Youngstown and fifty-two miles southeast of Cleveland. Warren has blast furnaces, iron foundries, and steel mills. Its factories make steel tanks, steel cables, electric motors, tools, and a great variety of iron and steel products. Warren was settled in 1798. W.R.McC.

WARREN, EARL (1891-), was the Republican nominee for Vice-President of the United States in 1948. Warren was born in Los Angeles, Calif., and educated at the University of California. He was elected Attorney General of California in 1938. Four years later he was elected governor of the state, and was re-elected in 1946.

WARREN, FRANCIS E. See WYOMING (Famous Men).

WARREN, JOHN COLLINS (1778-1856), was an American surgeon. He is chiefly remembered for taking part with the dentist William Morton in 1846 in the first public demonstration of ether as a surgical anesthetic. Warren's remark as he finished the operation, "Gentlemen, this is no humbug," is famous.

Warren was born in Boston of a family famous for Revolutionary patriots. He was educated at Harvard College, and later studied medicine in London, Edinburgh, and Paris. In 1809 he became a professor of anatomy and surgery at Harvard Medical School, which his father had helped to found. Between 1815 and 1821

Warren helped found the Massachusetts General Hospital and became its surgeon-in-chief. F.E.G.

See also MORTON, WILLIAM THOMAS GREEN.

WARREN, JOSEPH (1741-1775), was called the first great martyr of the Revolutionary War. He was the man who sent Paul Revere on his midnight ride to Lexington to warn the patriots that the British were coming. Soon afterward, Warren was killed in the Battle of Bunker Hill.

Warren was born in Roxbury, Mass., and was educated at Harvard College. He studied medicine and moved to Boston to practice. Warren was a leading figure in the events which led to the outbreak of the Revolution. In April, 1775, Warren was elected president of the provincial congress which met at Watertown, Mass. Warren had been a major general in the Massachusetts forces, but he insisted on serving as a volunteer soldier at Bunker Hill. The Bunker Hill Monument was erected on the spot where he fell. N.G.G.

WARREN, MERCY OTIS (1728-1814), was one of the first American women to become prominent as a writer.

She was born in Barnstable, Mass. Her brother was James Otis, one of the leaders of the revolution in Massachusetts. Through him and through her husband, James Warren (1726-1808), she came to know many of the political leaders of the colony. These friendships gave her the necessary knowledge to write such dramatic political satires as *The Adulater* and *The Group*.

But Mercy Otis Warren is perhaps best known for her three-volume *History of*



Mercy Otis Warren was a leading literary figure of the American colonies.

the Rise, Progress, and Termination of the American Revolution. The work is one of the most lively accounts of the Revolution which has ever been written. Mercy Otis Warren also wrote poems and plays included in *Poems Dramatic and Miscellaneous*. C.M.E.

See also OTIS, JAMES.

WAR RISK INSURANCE. In wartime the risks to the lives of soldiers, sailors, and merchant seamen and to property at sea and in war zones become too great for private companies to cover. The government then takes over the task of insuring such risks. In World War I, the United States Government insured all vessels and their cargoes flying the United States flag. In June, 1917, the government also insured the lives of merchant seamen for amounts up to \$5,000. In October of the same year,

a law was passed making available insurance to members of the armed forces up to \$10,000.

The National Service Life Insurance Act of 1940 offered a similar plan to members of the armed forces in World War II. This insurance could be converted into standard peacetime policies after the war. The United States Veterans' Administration had more than fifteen million applications for insurance from members of the armed forces. This amounted to about \$146,000,000,000 worth of insurance, or about half the total amount of life insurance written in the United States. Seamen were insured as they had been in World War I. Seamen's insurance was administered by the War Shipping Administration. The insurance on ships, cargoes, and other private property was guaranteed by the War Damage Corporation, a branch of the Reconstruction Finance Corporation. R.D.P.

See also VETERANS' ADMINISTRATION.

WAR SAVINGS BONDS. Modern war is enormously expensive. The United States Government spent more money during World War II than it had spent during all the years of its history. To meet this heavy cost, the government set up a War Bond program much like the one used in financing World War I. War Savings Bonds were issued as part of this program.

Heavy spending for national defense resulted in the launching of the first "Defense Savings" bond issue in May, 1941. The outbreak of World War II changed the "Defense Savings Bonds" to "War Savings Bonds." Several types of these bonds were issued. The "Series E" bonds, for purchase by the general public, were issued in denominations of \$25, \$50, \$100, \$500, and \$1,000. These bonds were offered to individual purchasers for 75 per cent of maturity value with maturity in ten years. If the bond were held to maturity, the interest rate amounted to nearly 3 per cent annually. Bonds could be redeemed before maturity. By September 30, 1946, more than \$60,000,000,000 had been paid for War Savings Bonds and Stamps.

War Savings Stamps were issued in values of ten, twenty-five, and fifty cents, one dollar, and five dollars. A person who bought \$18.75 worth of these stamps could exchange them for the bond of lowest value.

Other series of War Bonds, in larger denominations up to one million dollars, were issued for purchase by corporations and other large investors. The first War Loan issue of War Bonds was heavily oversubscribed. As the war progressed, the Second, Third, Fourth, Fifth, Sixth, and Seventh War Loans were launched. After the surrender of Japan, the government held an Eighth, or Victory, Loan drive. As a whole, all these drives were oversubscribed, and in all but two the War Savings Bonds were oversubscribed. R.W.M.E.

WARSAW, another name for the black jewfish. See JEWFISH.

WARSAW, *WAWR* saw (estimated population 448,000), is the capital of Poland. In Polish it is called *WARSZAWA*. The city was once a thriving center of trade and culture. But World War II left Warsaw in ruins, and the Poles had to start rebuilding their ancient capital. Parts of the city have been rebuilt many times. Warsaw is very old and has a rich history.

Location. Warsaw lies on the left bank of the Vistula



Clyde Brown

A Street in Warsaw, Poland, Before World War II. Much of the City Was Destroyed during the War

River. The city is built on terraces which rise above the river. The suburb of Praga lies across the river. Warsaw's location in the heart of a fertile farming region has made the city a center of trade.

Description. Warsaw was once a gay and beautiful capital. It had splendid old palaces and churches, fine new buildings, and beautiful parks. The city was famous for its university, theaters, concert halls, museums, and libraries. The center of Warsaw was a square called Place Pilsudski. The chief boulevard, Ujazdowska Avenue, was lined with lime trees and cafes.

The most famous of Warsaw's landmarks included the Cathedral of Saint John, which dated from A.D. 1360, the royal palace, the Saxon palace, and the Casimir palace, where the University of Warsaw was located. The most famous of the modern buildings was a fine radium institute and hospital which the Poles built in honor of Marie Curie, the great Polish scientist.

The People. Most of the 1,389,000 persons who lived in Warsaw before World War II were Poles. But there were also many Germans. About four fifths of the people believed in the Roman Catholic faith. Most of the other people were Jews. During World War II, German troops killed many thousands of the people of Warsaw.

Industry and Trade. For many years Warsaw has been

a busy manufacturing city. Its varied products have included handmade articles as well as machinery, food products, and textiles. The port of Warsaw did a huge shipping trade before World War II. Goods and passengers were landed here on their way to the Soviet Union, Germany, the Balkan countries, and the Baltic Sea.

History. During the Middle Ages, Warsaw was the home of the dukes of Mazovia. In 1587 King Sigismund III moved the capital of his Polish kingdom from Krakow to Warsaw. Swedish armies seized the city twice, in 1656 and 1702. But Warsaw remained the capital of an independent country until the late 1700's, when Poland was divided between Russia, Prussia, and Austria. Warsaw then became part of Russian Poland. Napoleon made Warsaw an independent duchy in 1807. After Napoleon was defeated, Russia again gained possession of Warsaw. In 1830 and 1831 the Poles revolted against Russian rule. But the revolution failed, and Russia was left in complete control of the city.

During World War I, Germany took and held Warsaw. After the war the city became the capital of an independent Poland for the second time. There was fighting in Warsaw once more during the summer of 1939, when the Germans began World War II by invading

Poland. The city fell after a few weeks. German forces occupied Warsaw for more than five years. Late in 1944, Soviet forces reached Praga. Polish citizens in Warsaw believed that relief was coming soon and attacked the German occupation forces. The Poles fought for two months and then were forced to yield to superior German strength. Soviet armies finally entered the city in January, 1945. After World War II ended, Warsaw became for the third time the capital of an independent Poland. T.Z.

WARSAW CONVENTION. See AVIATION (International Treaties and Agreements).

WARSHIP. See NAVY.

WAR SHIPPING ADMINISTRATION. See MERCHANT MARINE (World War II).

WARS OF SUCCESSION. See SUCCESSION WARS.

WARS OF THE ROSES. During the late 1400's, a struggle took place between two royal houses of England. The House of York fought the House of Lancaster for the possession of the English throne. The battles were known as the Wars of the Roses.

The struggle was named for the insignia, or symbol, each side adopted. The House of Lancaster took a red rose for its emblem, and the House of York used a white rose. The wars began in 1455 with the battle of Saint Albans. In 1485 the battle of Bosworth brought the conflict to an end.

When war broke out Henry VI was king of England. He was the grandson of the Lancastrian, Henry IV, who had seized the throne in 1399. Richard, Duke of York, claimed that Henry VI had no right to the English throne. Early in the war the followers of the Duke of York succeeded in putting Henry off the throne. Edward IV, of the House of York, was crowned king. Later, Henry again became king. But he lost his crown once more to Edward after the battle of Tewkesbury in 1471. The Yorkists held power until Richard III lost his throne to the Lancastrian Henry Tudor, Earl of Richmond, who became king as Henry VII in 1485.

With Henry VII a new and famous dynasty, the Tudor, came to the throne. It ruled England until the death of its greatest member, Elizabeth, in 1603. J.S.S.

See also LANCASTER; YORK.

WART. A wart is a growth of thick, hard skin over a small area. Warts usually occur on the fingers or hands but may appear on any part of the body. There may be one or several of these growths, but the tendency is for several to form. They are usually hard and dry, but sometimes small blood vessels grow up into them.

Warts are caused by some form of irritation. The people who have them are most often those who must use their hands in doing hard and dirty work.

The standard treatment for a wart is to cut it off close to the skin, and then burn the base with an acid. Strong nitric acid will destroy the wart if the person continues the treatment and does not give up. He should use this acid very carefully and apply it only to the wart. Any wart which is sore and hard to remove should be treated by a physician, for cancers sometimes develop from these growths.

Warts have a tendency to return, no matter how they are removed. Sometimes they appear to be contagious. They spread to near-by areas of skin, and occasionally

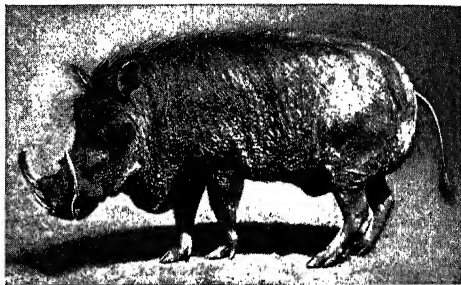
one person infects another. Some warts are caused by bacteria. The usual treatment for warts of this kind is to dust them with calomel, keep the mucous membrane or skin dry, and treat the bacterial disease.

Other treatments for warts are repeated greasing with castor oil, and repeated use of spirits of camphor. There is also a method of removing warts with an electric spark. P.R.C.

See also CANCER.

WART HOG is an African swine, and one of the world's ugliest mammals. Great curved upper tusks protrude from its huge flattened head. These tusks may be as much as two feet long on a big boar. Between the tusks and the eyes are three pairs of large "warts" from which the hog gets its name. The coarsely grained pale gray hide of the wart hog is very thinly sprinkled with stiff hairs which are brownish gray. A thin mane of long bristly hair hangs over its back and head, and sometimes gets in its eyes. Its tail has a tuft on the end. A large boar may weigh over two hundred pounds and is about thirty inches high at the shoulder.

The Dutch farmers call the wart hog *vlakte-vark*, or *pig of the plains*. It lives in dry, sandy country from southern Africa to Ethiopia and prefers open forest with



New York Zoological Society

The Wart Hog Is Called the World's Ugliest Animal

plenty of thickets for protection. The wart hog travels in small family groups. Old boars, however, usually prefer to live by themselves. The sow may produce as many as six to eight young at a time. Ordinarily, only half that number are born at one time. Wart hogs often use burrows that have been made by other animals. They eat almost everything — roots, plants of all types, birds' eggs, and even small mammals that they can catch or root out of the ground. They are not so courageous or fierce as the bush pigs, but are dangerous opponents if wounded and cornered. V.H.C.

Classification. The wart hog belongs to the family *Suidae*. The scientific name is *Phacochoerus aethiopicus*.

WARTON, THOMAS. See POET LAUREATE.

WARWICK, WAHR ik, RICHARD NEVILLE, EARL OF (1428-1471), was a famous English soldier and statesman. He is known to English history as "the kingmaker," and also as the "Last of the Barons."

Warwick was the eldest son of Richard Neville, Earl of Salisbury. He became Earl of Warwick after his marriage to Anne, daughter and heir of Richard de Beauchamp, Earl of Warwick. Warwick was one of the most powerful men in England during the Wars of the Roses.

Warwick commanded an army with great skill at the battle of Saint Albans in 1445. He fought on the side of his uncle, the Duke of York.

In 1460 war broke out again. Warwick again took the field and won the battle of Northampton, capturing the weak-minded King Henry VI. But later in the year the Yorkists were defeated at Wakefield. The Duke of York was captured and put to death. Warwick then became head of the Yorkist party as the guardian of his cousin, Prince Edward.

Another battle was fought at Saint Albans in 1461, and Warwick was defeated. But Warwick boldly proclaimed Edward, the Duke of York, king of England, and succeeded in having him crowned. The new king and his powerful adviser soon quarreled. In 1469 Warwick struck a bargain with Margaret, the wife of the ex-king Henry VI. Henry landed in England with an army and forced King Edward to flee. Warwick then restored Queen Margaret and Henry VI to the throne. But in 1471 Warwick met Edward in battle again, at Barnet. He was defeated and killed. A.M.

See also EDWARD (IV, England); HENRY (VI, England); WARS OF THE ROSES.

WARWICK, ROBERT RICH, SIR, EARL OF (1587-1658), was a British nobleman and colonial administrator. He organized privateering missions and colonial ventures as a member of the Virginia Company and of the Council of the New England Company. He helped found the colonies of Plymouth (Mass.), Connecticut, Virginia, and Rhode Island. His ship, the *Treasure*, engaged in privateering against the Spaniards in the West Indies, and in 1619 brought some of the first Negro servants ever sold in Virginia. In 1643 Warwick was appointed Lord High Admiral and Governor-in-Chief of all the British royal colonies. T.P.A.

WASATCH, WAW *sach*, **RANGE**. This part of the Rocky Mountain system is noted for the grandeur of its scenery. The Wasatch Range extends from the southern border of Idaho through northern Utah, passing east of Great Salt Lake, and forms the eastern wall of the region known as the Great Basin. The average elevation of the Wasatch Range is 10,000 feet. The highest peak is Mount Timpanogos (12,008 feet). The slopes of the range contain iron and silver ore. L.D.,jr.

WASH, THE, is a shallow bay off the North Sea on the east coast of England. The bay is about twenty-two miles long and fifteen miles wide. The Wash is one of the centers of the great North Sea fishing industry. The Ouse, Witham, Welland, and Nene rivers empty their waters into the Wash. H.U.S.

WASHBURN, ELIHU BENJAMIN (1816-1887), was an American Congressman who was called the "watchdog of the treasury" because he so firmly opposed needless spending. He was born at Livermore, Me., and was educated at Harvard College. In 1840 he was admitted to the bar and began to practice law in Galena, Ill. In 1853 he was elected to the House of Representatives and served until 1869, when he became Secretary of State under Ulysses S. Grant. Washburne held this position only a few days and then resigned to become Minister to France. In 1877 he returned to Chicago where he practiced law. W.B.H.

WASHBURN MUNICIPAL UNIVERSITY is a coeducational

school in Topeka, Kan. It was founded by the Congregational Church in 1865, but has been a municipal institution since 1941. In addition to courses in liberal arts, it has a school of law. Most out-of-town students live in dormitories or sorority and fraternity houses. The average enrollment is about 1,100. B.S.S.

WASHING MACHINE. For thousands of years one of the most tiresome of household tasks was the washing of clothes and linens. In early times women often washed clothes on smooth stones at the edge of running streams. The clothes had to be pounded and rubbed by hand to get them clean. In some primitive parts of the world women still use such methods. For a long time inventors tried to figure out an easier way to do such work. Even the use of a washboard, wringer, and tubs required much backbreaking labor. It was not until the modern washing machine was invented that women were freed from this hard work.

In 1858 Hamilton E. Smith, of Pittsburgh, Pa., patented the first mechanical washing machine. The first machines had revolving paddles in a boxlike tub. When a hand crank at the side of the tub was turned, the paddles turned in the tub, pushing the clothes through the water to force the dirt out. But these machines still required tiresome hand operation, and they were often hard on the clothes. In 1910 an electrically powered machine was developed. Hand work was no longer necessary. This machine was invented by Alva J. Fisher and manufactured by the Hurley Machine Company of Chicago. Since then electric washing machines have been improved constantly. Today many American homes are equipped with this work saver.

The electric washing machine has a *tub* or *tank*, an electric *motor* ($\frac{1}{4}$ horsepower), and a device in the center of the tub which does the actual washing. It is called an *agitator* or *turbulator*. The agitator does the work of human hands by constantly swishing the clothes around in the soapy water until the dirt has been removed. There are different types of agitators. Most of them are fixed to a rod or shaft in the center of the tub. The rod may move up and down in the tub at the same time that it turns from side to side. The agitator attached to it thus moves in two directions at the same time. It moves the clothes with it and causes the water to circulate through them. Some tubs have no agitator, but have an inner tub with many small holes through which the water runs back and forth between the two tubs. This movement increases the action of the water and makes for faster washing. There are also some types of electric washing machines which have the agitator or washing device attached to the lid of the tub. These kinds work much the same as other types of machines.

Very late types of electric washers are purely automatic in operation. They are connected to the hot and cold water supply of the house and no carrying of water is necessary. After the clothes are washed and rinsed, the water is automatically drained off. Then the tub in which the clothes were placed begins to turn at high speed and throws the water out of the clothes by centrifugal force. Thus, wringing the clothes is unnecessary. When the machine stops, the clothes are clean and partially dried out, and are thus ready for hanging on the line. R.F.Y.



Photos: Wash. State Apple Comm.; Gendreau

WASHINGTON THE EVERGREEN STATE

WASHINGTON was named in honor of the first President of the United States. The state gets its nickname, **THE EVERGREEN STATE**, from its vast, towering forests of firs, hemlocks, and other cone-bearing trees. It is also called **THE CHINOOK STATE**, for a tribe of Indians who once lived near the mouth of the Columbia River.

Sir Francis Drake discovered Puget Sound in 1578, while on his historic voyage around the world. But most of Washington remained an unexplored wilderness for more than two hundred years.

Today, Washington is the most thickly populated state of the entire Pacific Northwest. It has more people than any other state west of the Great Plains except California. Washington's location, its sheltered bays, and its fine natural harbors have helped to make it the gateway to Alaska and to the Orient. Ships from all parts of the world sail in and out of its great ports. One can see incoming freighters, loaded with teas, silks, and spices from the Orient, or with gold, copper, fish, and furs from Alaska. On their way from Washington, ships carry cargoes of lumber, flour, hides, machinery, fruit, and various food products. The mighty Grand Coulee Dam, one of the wonders of the modern world, is on the Columbia River in Washington. This dam is much larger than the Great Pyramid of Egypt. Enough concrete was used in building it to pave a four-lane highway reaching from Seattle to New York City. At Seattle, there are great aircraft factories where the famous "Flying Fortresses" were first built.

Washington is a state of such rare natural beauty that it is often called the "Switzerland of America." Some areas are as wild as they were before the coming of the white man. Washington has low coastal plains, mountain peaks which tower more than 14,000 feet above the sea, rain-drenched forests, and treeless desert lands. Along the coast, the climate is so mild that flowers bloom outdoors the year round. In the mountains, great glaciers and snow fields have remained unmelted for hundreds of years.

Washington leads the states in the mining of magnesite, used in making bricks and paper, in the production of wood pulp and plywood, and in the total value of its lumber industry. It is a great fruitgrowing land, and

raises more apples, raspberries, and blackberries than any other state. Only California raises more pears than Washington, and only Michigan raises more cherries. It is also a leader in the production of vegetable seeds and certain flower bulbs. Huge herds of beef cattle and sheep are raised in the eastern half of the state. Whitman County grows more wheat and peas than any other county in the United States. Washington is first among the states in the output of canned salmon, and except for Massachusetts, it leads in the value of fishery products.

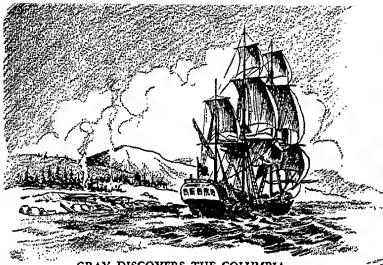
The Land and Its Resources

Extent: Area, 68,192 square miles (1,215 square miles of which are inland water), nineteenth in size among the states. **Greatest length** (north to south), 230 miles; **greatest width** (east to west), 340 miles. **Coast line**, 2,724 miles (including islands).

Physical Features: *Chief mountain ranges*, Blue, Cascade, Okanogan, Olympic, Selkirk. *Chief peaks*, Mount Rainier (14,400 feet), Mount Adams (12,470 feet), Mount Baker (10,750 feet), Glacier Peak (10,436 feet). *Elevation*, highest, 14,408 feet above sea level, Mount Rainier, in Pierce County; lowest, sea level along the Pacific Coast. *Chief rivers*, Chehalis, Columbia (chief tributaries, Chelan, Colville, Cowlitz, Kettle, Lewis, Okanogan, Pend Oreille, Snake, Spokane, Wenatchee, Yakima), Willapa. *Chief waterfalls*, Cascade, Eagle, Horseshoe, Klickitat, Ladder Creek, Metaline, Nooksack, Palouse, Rainbow, Snoqualmie, Spokane, Tap Tap, White River. *Chief natural lakes*, Chelan, Crescent, Quinalt, Samamish, Union, Washington, Whatcom; *chief artificial lakes*, Bonneville, Diablo, Grand Coulee, Long. *Chief islands*, San Juan group (172 islands; the largest are San Juan, Orcas, and Lopez), Whidbey.

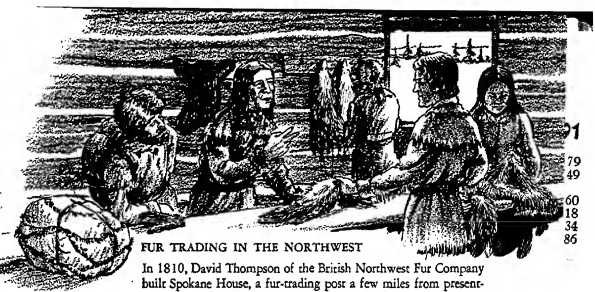
Pronunciation Guide

Chelan <i>shee LAN</i>	Rainier <i>ray NEER</i>
Hoquiam <i>HO kwih am</i>	San Juan <i>san HWAN</i>
Nez Percé <i>NAT PER SAY</i>	Snoqualmie
Nisqually	<i>snow KWAL mih</i>
<i>NIS kwah lee</i>	Spokane <i>spoh KAN</i>
Palouse <i>pah LOOZ</i>	Tacoma <i>tah KO mah</i>
Pend Oreille	Wailatpu
<i>PAHN doh RAY</i>	<i>WY ee LAT poo</i>
Puyallup <i>pew AL up</i>	Wenatchee <i>wee NACH ee</i>
Quinalt <i>kwee NULT</i>	Yakima <i>YAK ih mah</i>



GRAY DISCOVERS THE COLUMBIA

Although Sir Francis Drake came upon Puget Sound in 1578, the Columbia River was not explored until 1792. In that year, Captain Robert Gray, an American, discovered it and named it after his ship, the *Columbia*.



FUR TRADING IN THE NORTHWEST

In 1810, David Thompson of the British Northwest Fur Company built Spokane House, a fur-trading post a few miles from present-day Spokane. This was the first white settlement in the state.

MEMORABLE WASHINGTON EVENTS



"FIFTY-FOUR FORTY OR FIGHT"

In 1846, the boundary dispute between the United States and Great Britain was settled. By the Oregon Treaty, the northern boundary of Washington was fixed at latitude 49° instead of 54° 40', demanded during the presidential campaign of 1844.



LEWIS AND CLARK REACH THE PACIFIC

In the autumn of 1805, the Lewis and Clark expedition, sent out by Jefferson to explore the Upper Louisiana Territory, reached the Pacific after crossing the Rockies and descending the Snake and Columbia rivers.



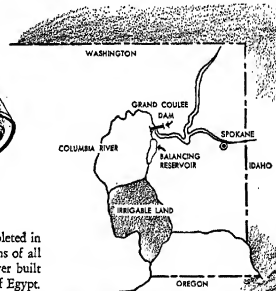
LEADING LUMBER STATE

Since 1905, Washington has been one of the chief lumber states. The first sawmill, run by water power, was operated by William Cannon at Fort Vancouver in 1826, and the first steam sawmill by Henry Yesler in 1833 in the Puget Sound country.



ORIGIN OF SALMON CANNING

From early Indian days, salmon caught in the Northwest were preserved by salting or smoking. In the 1860's, the first canneries were built on the Columbia, and the industry became important by 1880.



"THE BIGGEST JOB ON EARTH"

Grand Coulee Dam, begun in 1933 and completed in 1941, is one of the great engineering triumphs of all time. It is the mightiest piece of masonry ever built by man, surpassing even the Great Pyramid of Egypt.



79
49
60
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Climate: *Temperature*, average annual, 49° Fahrenheit; average summer, 64° F.; average winter, 33.7° F.; lowest on record, -42° F. at Deer Park (Jan., 1937); highest on record, 118° F. near Waukegan (July, 1928). *Precipitation*, average annual, 35.18 inches; average Apr. 1 to Sep. 30, 9.32 inches; average Oct. 1 to Mar. 31, 25.86 inches. *Snowfall*, average annual, 44.5 inches.

Location, Size, and Surface Features. Washington lies in the extreme northwestern section of the United States. Its capital, Olympia, is in about the same latitude as Duluth, Minn., and northern Maine. Washington is the smallest state west of Iowa, but it is larger than any state east of the Mississippi River. Washington has an unusually long coast line, because of the extent and jagged line of Puget Sound, with its many narrow inlets and numerous islands, and because of the indentations along the Pacific Ocean. Whidbey, the second largest island in the United States, is one of the hun-

reds of years ago a huge glacier crept down from Canada to a point south of present-day Olympia. The glacier left much soil and rock in the region, and formed Puget Sound and many lakes.

The Puget Sound Lowland makes up only about one tenth of the total area of Washington, but it has more than two thirds of its entire population, nearly three fourths of all its cities, and most of its factories and sawmills. Many of the original forests have been cut, but logging and sawmilling are still the leading industries. The region is one of the greatest fishing, shipbuilding, importing, and exporting centers of the Western Hemisphere. It also has many factories which turn the raw materials of the forest, sea, and farm into finished products. Most of the farmers specialize in dairying, market gardening, or in raising berries, fruits, poultry, rabbits, or honey for the near-by city markets. The chief mineral deposits of the region are coal, clay, limestone, sand, and gravel.

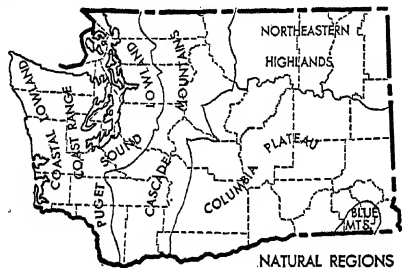
The *Cascade Mountain Region* is part of the long mountain range which extends southward from British Columbia into northern California. A number of isolated volcanic cones, all of which are now inactive, rise above the great central mass of mountains. Among them is majestic Mount Rainier, the highest mountain in the state, which lifts its crown of snow more than two and one-half miles above the sea. Four other volcanic peaks with active glaciers and permanent snow fields are Mounts Adams, Baker, and St. Helens, and Glacier Peak.

Except for the highest peaks, which are snow-covered, the entire range is covered with magnificent forests. The finest trees are on the rain-soaked western slopes. Lumbering is the leading industry of this thinly populated region. Mining is also important, especially of coal, gold, and copper.

The *Columbia Plateau* covers most of central and southeastern Washington. It is a great central basin, lying from 500 to 2,000 feet above sea level, and surrounded by a rim of higher lands. This region is part of the largest lava plateau in the world. It belongs to the so-called Inland Empire, which extends into northern Idaho and northeastern Oregon.

In the dry regions of Washington, which extend southward from the Okanogan Highlands to Oregon, sagebrush and bunch grass grow, and cattle, horses, and sheep are raised on large ranches. Orchards, world-famous for their apples, are found in the fertile valleys of the Wenatchee, Yakima, and other rivers. The great wheat-growing sections are south and west of Spokane, including the Ritzville, Big Bend, Palouse, and Walla Walla regions.

An interesting feature of eastern Washington is its coulees and scablands, especially in the Big Bend Region. The *coulees* are steep-walled canyons like trenches. These were the river beds of streams during the Ice Age, when glaciers blocked the Columbia River, and the melted water made new rivers. The Moses and Grand Coulee are chief among these long-dry canyons. The Grand Coulee is a great gorge from 500 to 1,000 feet deep, which was the main course of the Columbia River in the glacier period. The *scablands* are areas which have been stripped of topsoil by floods, leaving only the hard lava rock on the surface.



reds of islands in Puget Sound. For the boundaries of Washington, see the colored map.

The Cascade Mountains divide the state into two main natural regions, the Coastal Lowland, and the Coast Range Region. Smaller natural regions are the Puget Sound Lowland, the Cascade Mountain Region, the Columbia Plateau, the Blue Mountains Region, and the Northeastern Highlands.

The *Coastal Lowland*, lying along the Pacific Ocean, is forested with enormous trees which are hundreds of years old. The chief industries in this region are tree cutting, lumber sawing, and the manufacture of wood pulp and paper. Fishing, the canning of seafoods, and the manufacture of fertilizer and fish oil are also leading occupations. Several world-famous shipping centers are located here. The chief agricultural industries are dairying and the raising of potatoes, vegetables, berries, and poultry.

The *Coast Range Region* is part of the broad mountain mass which extends along the Pacific Ocean from Canada to southern California. In Washington, the Coast Range is made up of the Olympic Mountains in the north, the Willapa Hills in the south, and the valley of the Chehalis River, which forms a thirty-mile strip of lowland between the two heights. The Olympic Mountains are among the wildest parts of the United States. Large areas of these mountains have never been explored. The chief industries in this region are logging, among the foothills; sawmilling, mixed farming, and dairying, in the Chehalis Valley; and the production of electric power by harnessing the swift mountain streams.

The *Puget Sound Lowland* extends northward into British Columbia and southward into Oregon. Thousands

Total Population 1,736,191

Abden, (B4)	18,846	Buckley, (D3)	1,170	Denison, (H3)	35	Glacier, (D2)	62	Keller, (G2)	79
Acme, (C2)	225	Buddy, (C4)	54	Des Moines, (C3)	965	Glenoma, (C4)	468	Kelso, (C4)	6,749
Addy, (H2)	304	Buena, (C4)	655	DeWatto, (C5)		Glenwood, (D4)	131	Kendall, (C2)	
Adna, (B4)	905	Burbank, (G4)	31	Diamond, (D4)	78	Glenwood, (H4)		Kenmore, (C3)	560
Adrian, (F3)	20	Burley, (C3)	82	Disautel, (F2)		Globe, (B4)		Kennewick, (F4)	1,918
Aeneas, (G2)	108	Burlington, (C2)	1,632	Discovery Junction, (C3)		Goldbar, (D3)	307	Kennedy, (C3)	534
Agnew, (B2)		Burton, (C3)	264	Dishman, (H3)	440	Goldbar, (F3)	584	Kent, (C3)	2,586
AjLune, (C4)	69	Camas, (C5)	4,433	Dixie, (C4)	330	Goodhoe Hills, (L5)	60	Kerriston, (D3)	
Alameda, (F2)		Camden, (H2)	7	Doebay, (C2)	100	Goshoe, (C2)		Kew, (G2)	560
Albion, (H4)	206	Cape Horn, (C5)	37	Domination, (H2)		Govan, (C3)		Keyport, (C3)	424
Alder, (C4)	222	Cardnado, (D3)	462	Donald, (E4)	85	Graham, (C3)	571	Keystone, (G3)	
Alderda, (E5)	53	Carlisle, (A3)	264	Dowry, (B4)	300	Grand Coulee, (F3)	3,659	Kingston, (C3)	375
Alderton, (C3)	416	Carlsberg, (B2)	101	Dows, (C3)	150	Grandview, (F4)	1,449	Kiona, (F4)	55
Alderwood Manor, (C3)	514	Carlton, (E2)	101	Dryad, (E4)	213	Granger, (E4)	752	Kirkland, (C3)	2,084
Alfalpa, (E4)	929	Carnation, (D3)	265	Dryden, (B3)	300	Granite Falls, (D2)	683	Kitsap, (C3)	333
Algonia, (C3)		Carrolls, (C4)	30	Dunness, (B2)	136	Grant Orchards, (F3)		Kittitas, (E4)	501
Alford, (F4)	136	Cashmere, (E3)	1,465	DuPont, (C3)	232	Grapevine, (C3)	150	Kittitat, (D5)	687
Allyn, (C3)	466	Castle Rock, (B4)	1,182	Duval, (D3)	234	Grassmere, (D2)		Knappton, (B4)	50
Almira, (C3)	9	Cathlamet, (B4)	621	Eaglecliff, (B4)	12	Gravelles, (H3)		Kruse, (C2)	
Almo, (A3)	342	Cedar Falls, (D3)	20	Earlington, (C3)	722	Gray, (H2)		Kulshan, (C2)	
Alpha, (C4)	31	Cedonia, (C2)	20	East Olympia, (C4)	360	Gray Gables, (B3)		Kyro, (C4)	
Alstown, (F3)		Centerville, (E5)	145	Easton, (D2)	240	Grayland, (B4)		Lacamas, (C4)	
Alto, (G4)	100	Central Ferry, (H4)	13	Eastwood, (C2)	260	Grays River, (B4)	33	La Center, (C5)	193
Altona, (B4)		Centralia, (B4)	7,414	Eatonville, (C2)	359	Greenacres, (H3)	804	Lacey, (C3)	520
Amber, (H3)	89	Chard, (H4)		Eatonville, (C2)	996	Greenbank, (C2)	163	La Conner, (C2)	624
Amboy, (C3)		Chattaroy, (H3)	70	Edgemoor, (C2)	364	Gregor, (C4)	103	Lacrosse, (H4)	475
American Lake, (C3)	1,000	Chenahis, (C4)	4,857	Edmonds, (C3)	1,288	Guler, (D4)	110	Lake, (C3)	
Anacortes, (C2)	5,875	Chelan, (E3)	1,738	Edwall, (H3)	301	Hadlock, (C2)	311	Lake, (C3)	
Anacost, (H4)	187	Chelan Falls, (F3)	100	Elbe, (C4)	114	Hall, (C5)		Lake, (C3)	
Appleton, (D5)	22	Cheney, (H3)	1,551	Elberton, (H4)	151	Hamilton, (D2)	229	Lake, (C3)	
Arden, (H2)		Chesaw, (H3)	38	Eleanor, (H3)		Hampton, (C2)		Lake, (C3)	
Ardenvoir, (E3)	261	Chester, (H3)		Elcotton, (C4)	100	Hanford, (F4)	450	Lake, (C3)	
Ariel, (C4)	250	Chevelah, (H2)	1,565	Elk, (H2)	63	Hanson, (F3)		Lake, (C3)	
Asotin, (H4)	686	Chopaka, (F2)		Elma, (B4)	1,370	Harrington, (G3)	545	Lancaster, (H3)	
Attalia, (C4)	66	Chumstick, (E3)		Eltopia, (F4)	84	Hartford, (D2)	212	Lapush, (C2)	338
Auburn, (G4)	4,211	Cinebar, (C4)	236	Elwha, (B2)		Hartline, (F3)	168	Latah, (H3)	236
Azwell, (F3)	163	Clallam Bay, (A2)	332	Elwood, (C4)		Hatton, (C3)	43	Lauer, (G3)	270
Baldi, (D3)	13	Clarkston, (H4)	3,116	Emden, (G3)		Havill, (F2)	24	Lauridsen, (B2)	
Barger, (F5)		Clayton, (H3)	319	Enrico, (H4)	495	Havill, (F2)	24	Laurier, (C2)	60
Baring, (C3)	100	Clearlake, (E3)	638	Ennis, (C	353	Hazel, (D2)		Laurie, (C2)	
Barry, (G2)		Clearwater, (A3)	638	Ennis, (C	353	Hedges, (F4)		Lawrence, (C2)	
Barstow, (C2)		Cle Elum, (E3)	2,230	Ennis, (C	353	Hedges, (F4)		Leadpoint, (H2)	26
Battle Ground, (C5)	403	Ciffdell, (E4)		Ennumclew, (D3)	2,627	Helgate, (C2)	29	Leahy, (F3)	43
Batum, (G3)	6	Cliffs, (E5)		Ephrata, (F3)	951	Helgate, (C2)		Leavenworth, (E3)	1,608
Bay Center, (A4)	263	Clinton, (C3)	550	Espanola, (H3)	236	Helsing Jc., (B4)		Leban, (B4)	411
Bay View, (C2)	153	Clipper, (C2)	179	Espel, (C4)		Helsing Jc., (B4)		Leese, (F2)	
Bea View, (C2)	230	Cloverland, (H4)		Eureka, (C4)	60	Henry, (C3)		Leland, (C3)	
Beatrice, (C4)	230	Clyde, (C4)	23	Evans, (G2)	39	Hilland, (H3)		Lester, (D3)	313
Beaver, (A4)	130	Colbert, (H3)	21	Everett, (C3)	30,224	Hillard, (H3)		Lester, (D3)	313
Beebe, (F3)		Colby, (C4)	2,853	Everett, (C3)	30,224	Hocking, (C5)	58	Levey, (G4)	
Belfair, (C3)	1,222	College Place, (G4)	1,318	Everett, (C3)	30,224	Hocking, (C5)	58	Levey, (G4)	
Bell, (H3)		Colton, (F4)	262	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Belleuve, (C3)	975	Colville, (H2)	2,418	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bellingham, (C2)	29,314	Conconully, (F2)	187	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Belmont, (H3)	22	Concrete, (D2)	859	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Benton City, (F4)	101	Connell, (C4)	365	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Benton City, (F4)	101	Conway, (G2)	150	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Berrie, (E3)		Cook, (D5)	58	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Berrie, (E3)		Copalis Beach, (A3)	583	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Beverly, (F4)	67	Copalis Crossing, (A3)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Beverly Park, (C3)	725	Coppel, (C4)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bickleton, (E5)	233	Corfu, (F4)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bingen, (D5)	600	Cosmopolis, (B4)	1,207	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Black Diamond, (C3)	1,112	Cougar, (C4)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Blaine, (C2)	1,524	Coulee City, (F3)	744	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Blanchard, (C2)	237	Covaduville, (C2)	325	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Blackhouse, (E5)	15	Covada, (C2)	7	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Blackhawk, (H2)	31	Covill, (B2)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bluestem, (C3)	34	Covington, (C3)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bly, (B2)	341	Creston, (G3)	281	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bolles, (G4)		Cumberland, (D3)	235	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bordeaux, (B4)		Cunningham, (G4)	40	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Boothell, (C3)	794	Curlew, (C2)	122	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Boundary, (H2)		Cusick, (H2)	404	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bow, (C2)	269	Custer, (C2)	188	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Boys, (G2)	17	Dabob, (C3)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Boydston, (E4)		Dalkena, (H2)	49	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bremerton, (C3)	15,134	Danville, (G2)	39	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Brewster, (F2)	44	Darrington, (D2)	754	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bridgeport, (F2)	320	Day, (C3)	1,377	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Brierley, (E3)		Dayton, (H4)	3,026	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Brinnon, (C3)		Decatur, (C2)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Brookfield, (B4)	59	Deerpere, (A2)	62	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Brooklyn, (B4)	299	Deep River, (B4)	126	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Brownsville, (C3)	104	Deer Harbor, (B2)	120	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bruce, (F4)		Deer Park, (H3)	1,070	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bryant Prairie, (C5)	200	Delrio, (F2)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bryant, (C2)	600	Deming, (C	270	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Asotin, (H4)	686	Chopaka, (F2)		Elma, (B4)	1,370	Harrington, (G3)	545	Lancaster, (H3)	
Attalia, (C4)	66	Chumstick, (E3)		Eltopia, (F4)	84	Hartford, (D2)	212	Lapush, (C2)	338
Auburn, (G4)	4,211	Cinebar, (C4)	236	Elwha, (B2)		Hartline, (F3)	168	Latah, (H3)	236
Azwell, (F3)	163	Clallam Bay, (A2)	332	Elwood, (C4)		Hatton, (C3)	43	Lauer, (G3)	270
Baldi, (D3)	13	Clarkston, (H4)	3,116	Emden, (G3)		Havill, (F2)	24	Lauridsen, (B2)	
Barger, (F5)		Clayton, (H3)	319	Enrico, (H4)	495	Havill, (F2)	24	Laurier, (C2)	60
Baring, (C3)	100	Clearlake, (E3)	638	Ennis, (C	353	Hazel, (D2)		Laurie, (C2)	
Barry, (G2)		Clearwater, (A3)	638	Ennis, (C	353	Hedges, (F4)		Lawrence, (C2)	
Barstow, (C2)		Cle Elum, (E3)	2,230	Ennis, (C	353	Hedges, (F4)		Leadpoint, (H2)	26
Battle Ground, (C5)	403	Ciffdell, (E4)		Ennumclew, (D3)	2,627	Helgate, (C2)	29	Leahy, (F3)	43
Batum, (G3)	6	Cliffs, (E5)		Ephrata, (F3)	951	Helgate, (C2)		Leavenworth, (E3)	1,608
Bay Center, (A4)	263	Clinton, (C3)	550	Espanola, (H3)	236	Helsing Jc., (B4)		Leban, (B4)	411
Bay View, (C2)	153	Clipper, (C2)	179	Espel, (C4)		Helsing Jc., (B4)		Leese, (F2)	
Bea View, (C2)	230	Cloverland, (H4)		Eureka, (C4)	60	Henry, (C3)		Leland, (C3)	
Beatrice, (C4)	230	Clyde, (C4)	23	Evans, (G2)	39	Hilland, (H3)		Lester, (D3)	313
Beaver, (A4)	130	Colbert, (H3)	21	Everett, (C3)	30,224	Hillard, (H3)		Lester, (D3)	313
Beebe, (F3)		Colby, (C4)	2,853	Everett, (C3)	30,224	Hocking, (C5)	58	Levey, (G4)	
Belfair, (C3)	1,222	College Place, (G4)	1,318	Everett, (C3)	30,224	Hocking, (C5)	58	Levey, (G4)	
Bell, (H3)		Colton, (F4)	262	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Belleuve, (C3)	975	Colville, (H2)	2,418	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bellingham, (C2)	29,314	Conconully, (F2)	187	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Belmont, (H3)	22	Concrete, (D2)	859	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Benton City, (F4)	101	Connell, (C4)	365	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Benton City, (F4)	101	Conway, (G2)	150	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Berrie, (E3)		Cook, (D5)	58	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Berrie, (E3)		Copalis Beach, (A3)	583	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Beverly, (F4)	67	Copalis Crossing, (A3)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Beverly Park, (C3)	725	Coppel, (C4)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bickleton, (E5)	233	Corfu, (F4)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bingen, (D5)	600	Cosmopolis, (B4)	1,207	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Black Diamond, (C3)	1,112	Cougar, (C4)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Blaine, (C2)	1,524	Coulee City, (F3)	744	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Blanchard, (C2)	237	Covaduville, (C2)	325	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Blackhouse, (E5)	15	Covada, (C2)	7	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Blackhawk, (H2)	31	Covill, (B2)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bluestem, (C3)	34	Covington, (C3)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bly, (B2)	341	Creston, (G3)	281	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bolles, (G4)		Cumberland, (D3)	235	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bordeaux, (B4)		Cunningham, (G4)	40	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Boothell, (C3)	794	Curlew, (C2)	122	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Boundary, (H2)		Cusick, (H2)	404	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Bow, (C2)	269	Custer, (C2)	188	Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Boys, (G2)	17	Dabob, (C3)		Everett, (C3)	30,224	Hocking, (C5)	58	Lewis, (D4)	
Boydston, (E4)		Dalkena, (H2)	49	Everett, (C3)	30,224	Hocking, (C5)			

● County seat.

Total Population 1,736,191

[illegible]

● County seat.

The *Blue Mountains Region* is made up of the mountains which extend northeastward from Oregon. Hay, grain, and other crops are raised in the larger valleys, and the mountain slopes are used as summer pastures.

The *Northeastern Highlands* are made up of the Okanogan and Selkirk Mountains. Both of these ranges are part of the Rockies. Many of the trees which once covered the region have been cut, and most of the forested lands are now included within national forests, but lumbering is still a leading industry. The chief minerals of the region include gold, lead, magnesite, clay, limestone for making Portland cement, iron, silver, zinc, copper, and building stone.

Rivers and Lakes. The Columbia River drains more than half of the total area of Washington, and large boats can use its waters for 500 miles from its mouth. In the west, where the rainfall is heavy, streams are more numerous than in the desertlike east. Many of the rivers are famous for salmon and various other fish, which use their waters as spawning grounds, or places to lay their eggs. In the east the streams supply water for irrigation and for home and city use. Many of the rivers have a steady flow and break into falls and rapids, which makes Washington a leading state in the amount of water power that could be developed. Only about one tenth of the water power is used, yet California and New York are the only states which have developed more water power than Washington. It has been figured that the Columbia River has more than two fifths of the potential water power of the United States, and could generate more electricity than any other stream in North America.

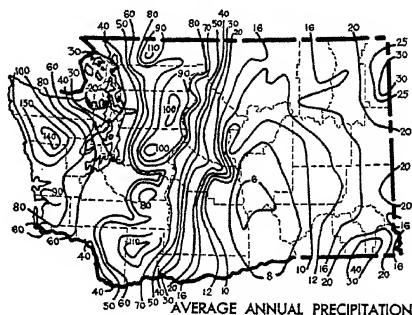
The rivers which empty into Puget Sound are short, but they carry a lot of water and are useful as a water supply for cities and in providing power for industry. They are also used in floating logs to sawmills. The Snoqualmie, the Snohomish, and the Skagit rivers, on which Seattle has built the Diablo and other huge dams and electric power plants, are the most important of these short rivers.

The area around Puget Sound is dotted with lakes that were formed when glaciers scooped out the land and water filled the hollow places. Lakes Washington, Samamish, and Whatcom are the largest and best-known among these glacial lakes. Other fresh-water lakes include the Crescent and Quinalt on the Olympic Peninsula to the west of the Sound. Both of these lakes are popular summer resorts. There are also many beautiful lakes among the Cascade Mountains. The largest is fifty-mile-long Lake Chelan, on the eastern slope. Lake Chelan is the longest natural lake in the state. But the artificial Grand Coulee Dam Reservoir, 151 miles in length, is more than three times as long.

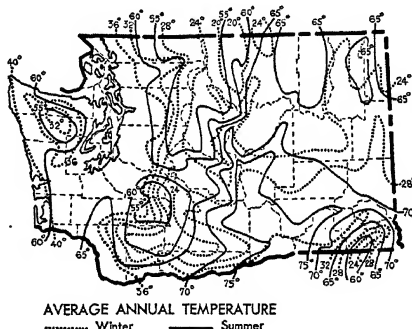
Climate. Washington has a milder climate than any other part of the United States in the same latitude. It also has a greater range in rainfall than any other state. Most of the rain falls during the winter. Snowfall varies widely, ranging from about five inches along the coast to 600 inches on the southern slopes of Mount Rainier.

The western section, which is tempered by the winds which blow over the warm waters of the ocean, has a mild, healthful, and bracing climate. The summers are delightfully cool, and the winters are mild.

The high Cascade Mountains keep many of the ocean winds from reaching eastern Washington and cause



them to lose much of their moisture on the high western slopes. The eastern section therefore has a less mild climate and receives less rainfall than the area farther west. Agriculture is carried on by dry-farming methods where there is no irrigation. The eastern section has generally hot summers and cold winters. But temperatures are milder here than in the plains to the east, because the eastern region is tempered by the warm dry



winds, called "chinooks," that blow down the Rocky Mountain slopes in winter and early spring. But occasionally the cold air which moves down from Canada causes winter temperatures to drop in eastern Washington to as low as -30°F .

Natural Resources. Washington's most important natural resources are vast forests, fertile soils, rich grasslands, natural harbors, varied minerals, great water power, and huge quantities of fish. More than 3,000 kinds of native flowers, and such flowering shrubs as the western dogwood and evergreen rhododendron, add to the beauty of the state.

Washington has large numbers of big game, including elk, bear, and three kinds of deer. Among its smaller fur-bearing animals are the Canadian lynx, western bobcat, red fox, western fisher, raccoon, mink, marten, badger, skunk, rabbit, and squirrel. Game birds found in Washington include the pheasant, mountain partridge, sage grouse, white-tailed ptarmigan, wild goose, wild duck, and quail.

Conservation and Development. The Federal Soil Conservation Service maintains stations which help

farmers and ranchers to improve their soil and prevent loss of soil by erosion. The Federal Government has also set aside large areas as national forests.

In eastern Washington there are numerous storage reservoirs, including the Grand Coulee Dam and several on the Yakima River and its branches. These dams have been built to conserve water to reclaim dry land by irrigation. Bonneville Dam, on the Columbia River, is a power and waterway-improvement project. In western Washington many drainage and flood-control projects have also been built. Among these is the Mud Mountain Dam, east of Tacoma, which was built to control the waters of Puyallup River.

Fishing, hunting, and trapping are regulated by law, and bird refuges and game preserves are maintained. Artificial hatching of salmon, fresh-water game fish, and upland game birds helps to maintain wildlife.

The People and Their Work

Population: 1,736,191 (1940), ranking thirtieth among states. *Density,* 25.9 persons per square mile, ranking thirty-fourth. *Distribution,* urban, 53.1 per cent; rural, 46.9 per cent. *Largest cities,* Seattle (368,302), Spokane (122,001), Tacoma (109,408), Everett (30,224), Bellingham (29,314). *Chief ports,* on Puget Sound, Bellingham, Bremerton, Everett, Olympia, Port Angeles, Seattle, Tacoma; on Grays Harbor, Aberdeen, Hoquiam; on Willapa Bay, Raymond, South Bend; on the lower Columbia River, Ilwaco, Kelso, Longview, Vancouver.

Chief Products: *Agricultural,* dairy products, wheat, fruits (especially apples, pears, cherries, and peaches), hay, poultry and eggs, cattle and calves, oats, corn, barley, potatoes and other vegetables, berries, sugar beets, hops, nuts, flower bulbs, seeds, sheep and wool, furs. *Fishery,* salmon, halibut, and other deep-sea fish; oysters, clams, crabs, shrimps. *Mineral,* sand and gravel, crushed stone, gold, coal, magnesite, magnesium salts, copper, zinc, mercury, clays. *Manufactured,* lumber, lumber products (including wood pulp, paper, furniture, plywood, and planing-mill products); canned fruits, peas and other vegetables, and fish; flour; condensed milk; aircraft; aluminum; magnesium; explosives; clay products; ships; meat-packing products.

The People. The earliest white men to live in what is now Washington were chiefly American and English explorers and missionaries. When Washington Territory was created in 1853, there were only about 4,000 white people in the region. But by 1890, after Washington had been a state for only a year, the population was 349,390. Most of the newcomers were Americans from the East, who had come to Washington to work at farming, lumbering, fishing, mining, or shipbuilding. Between 1890 and 1900, the desertlike lands of the eastern section were reclaimed, and additional farmers and large numbers of ranchers and fruitgrowers came to the state. In 1900 the population had grown to 518,013. Only 76,365 were foreign-born whites, and almost all the people were English-speaking persons, Germans, or Scandinavians.

In 1904, 97.8 per cent of the population were whites. This percentage is much higher than in most other states. Nearly half of the population belonging to other races were Oriental, chiefly Japanese (14,565); less than one third were Indian (11,393); and most of the remaining people were Negroes (7,424). The Indians lived mostly on eighteen reservations, and made their living largely through farming, logging, or fishing. Foreign-

born whites made up less than one eighth of the total population. The largest groups were from Canada, Sweden, Norway, England, Germany, Finland, Italy, the Soviet Union, Scotland, and Denmark.

Lumbering. Washington has more than 24,000,000 acres of forest, and is second only to Oregon in the amount of its standing timber, most of which is in forests that have never been cut. As early as 1788, John Meares, the English sea captain, sailed from Puget Sound with a cargo of ship spars for the China trade.

The first sawmill was established at Fort Vancouver in 1826 with hand-operated machinery which was brought from London. The first water-run mill was built at Tumwater near Tacoma, in 1846, and the first steam mill, also on Puget Sound, began operation in 1853. Today, the state supplies nearly one fifth of all the lumber produced in the United States. The early settlers used only axes and handsaws to cut trees as large as 200 feet tall and ten or twelve feet around. Today, most of the logging is done by large companies, and most of the giant, power-driven sawmills are located at the mouths of rivers.

Douglas fir and western hemlock grow in western Washington, which has the finest timber of the state. Here, too, large numbers of Sitka spruce, western red cedar, and several other varieties of trees are found. Important stands of Ponderosa pine, larch (locally called tamarack), white pine, and other varieties grow in eastern Washington, chiefly on the eastern slopes of the Cascades, in the Northeastern Highlands, and among the Blue Mountains. The most common hardwood trees are the alder, broad-leaved maple, and aspen.

Fisheries. At least 75 per cent of the commercial fisheries of the state are on Puget Sound, which is especially famous for its sockeye salmon. Seattle is one of the largest salmon markets in the world, and handles fish from both Washington and Alaska. It is also the greatest halibut port in the world. The Columbia River produces more salmon than any other river on earth. The principal catch is the Chinook species. Other yields of fish, especially salmon, are taken from Grays Harbor and Willapa Bay. Enormous catches of cod, mackerel, smelt, herring, clams, crabs, oysters, and shrimps are also taken along the coast.

The oyster industry is especially important in Puget Sound and Willapa Bay, where the waters are shallow. The state has set aside about 14,000 acres of oyster beds in the waters of Puget Sound.

Minerals. Washington has the only large coal deposits in the Pacific states. Eighty per cent of the coal is subbituminous, or very soft. The leading coal-producing county is Kittitas, on the eastern slope of the Cascades, followed by King, Pierce, Whatcom, Thurston, and Lewis counties on the west side of the mountains. But less coal is being mined today than in the early years, because more electricity and California oil are being used.

A little natural gas comes from the Rattlesnake Mountains, but no oil has been found in commercial amounts. Brick, tiles, pottery, and terra-cotta clays are found throughout the state. The largest magnesite deposit in the world is near Chewelah. This mineral is mined for use as a heat insulator and in the manufacture of magnesium. Metals are found chiefly in the northern

Cascades and the Okanogan Highlands. These include gold, copper, zinc, silver, lead, and tungsten. Copper and gold are found at Holden, near the head of Lake Chelan. Zinc is mined at Metaline, in Pend Oreille County; and gold is mined at Republic, in Ferry County. Mercury is produced near Morton, in Lewis County. Other minerals which are found in the state include soda, dolomite, sodium phosphate, and iron ore, found in the central and northern sections of the state.

Manufactures. Washington manufacturing industries have grown rapidly because of an abundant supply of cheap fuel and power. More than half of the value of all manufactured products is made up by wood pulp and paper, sawed lumber, plywood, veneer, and various woodworking products. The state also produces doors, sashes, and furniture, and a large part of the shingles and laths made in the United States.

Several important industries are based on agricultural products. These include the milling of flour and grit; meat packing; the canning, freezing, and preserving of fruits, vegetables and berries; the processing of sugar beets; and the production of butter, cheese, condensed milk, breakfast foods, and bakery goods. Only Alaska cans more salmon than Washington, and most of the Alaska salmon is sent to market by way of Seattle.

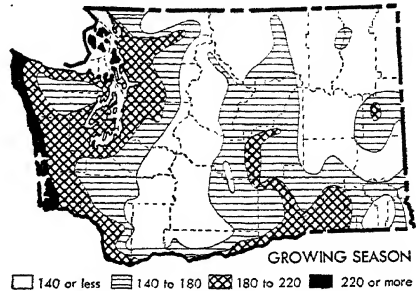
Manufactured products which use minerals include Portland cement, bricks, and other clay products, and magnesite. Aluminum is made at Vancouver, Tacoma, Spokane, and Longview. Steel is made at Seattle, magnesium is produced at Spokane, and tin cans are made at Walla Walla. Copper is smelted at Tacoma. Seattle, Tacoma, Vancouver, and Bremerton are noted for their shipbuilding, an industry which enlarged greatly during World Wars I and II. Bremerton is the location for a large United States Navy Yard, which was established in 1891. The Boeing aircraft plant was established at Seattle during World War I. During World War II, the all-metal "Flying Fortresses" manufactured at the Boeing plant became world famous. Seattle is the greatest manufacturing center in western Washington, where lumber products are most important. Spokane is the chief industrial city in eastern Washington, where grain and meat products lead.

Agriculture. In the western lowlands, especially in the river deltas and flats and in the old lake beds, rich soil and plentiful moisture are well suited to the growing of oats, barley, fruits, vegetables, sugar beets, and hay. In the desertlike sections of the east the soil is rich in humus, or rotted vegetable and animal matter. Here are farms which range from 600 to more than 1,000 acres. The farmers of the region raise huge crops of wheat that are harvested with large combine machines. Only Kansas, North Dakota, Oklahoma, and Nebraska have a greater yearly wheat production than Washington, as averaged over a period of ten years.

Washington also raises excellent crops of other grains, including corn, rye, and flaxseed. Hops are a specialty of the Yakima Valley. Hay, especially timothy and alfalfa, is also raised and largely fed to livestock. Peas are an important crop in eastern Washington.

Fruits, Vegetables, and Flowers. Most of the commercial apple crops comes from large orchards in the irrigated valleys east of the Cascades, especially the Wenatchee,

Yakima, and Okanogan valleys. Washington grows one out of every four apples sold in the United States, and the state ships large quantities of the fruit to all parts of the world. Most of the apples are sold through co-operatives, or groups of farmers who market their fruit



together. Cherries, pears, peaches, plums, and grapes are also widely grown, especially in the irrigated eastern valleys and around Vancouver. Prunes and apricots are other important fruit crops of the Vancouver region and the Walla Walla Valley. Washington also ranks high in the growing of strawberries, loganberries, raspberries, blackberries, gooseberries, blueberries, and cranberries.

Potatoes are widely raised near the larger cities of the Puget Sound Lowland, and in Yakima and Spokane counties. Other vegetables that are raised include lettuce, onions, asparagus, and peas. Washington leads the states in the production of seed peas, and raises more than 80 per cent of all the cabbage and turnip seeds of the United States. It also grows more narcissus, tulip, and iris bulbs than any other place in the world except The Netherlands. Lily, crocus, gladiolus, and various other flower bulbs are raised. Nuts, especially filberts, are also grown.

Dry Farming and Irrigation. The dry lands are low in humus, but otherwise they are fairly fertile, and produce good crops when the land is irrigated. The chief irrigated regions are the Columbia Basin and the valleys of the Yakima, Wenatchee, Okanogan, Spokane, Walla Walla, and Snake rivers. The Yakima irrigation project is planned to provide water for about 600,000 acres, and the Grand Coulee is designed to irrigate more than 1,000,000 acres. In the semiarid sections of eastern Washington, most of the wheat is raised by dry farming, a method which makes the most of the little moisture in the soil.

Livestock and Dairying. In early days, livestock raising was practically the only industry of eastern Washington. Now much of the once grassy plateau has been planted in wheat. But the drier eastern sections are still used as pastures for large herds of beef cattle and flocks of sheep.

Dairying is usually the most important agricultural industry, and is centered chiefly in western Washington and in Spokane, Walla Walla, and Stevens counties. Washington herds are famous for their high average milk and buttermilk fat production per cow, because of the mild winters and rich grasslands. Large amounts of dressed poultry and millions of dozens of eggs are shipped each year to the cities of the East. Horses, hogs, and bees are also widely raised. Fur farming is impor-

tant. Silver fox and mink are the leading fur-bearing animals. Seattle is one of the largest fur markets of the United States. Buyers from all parts of the world visit the city, to buy raw skins and pelts that have come from the forests of Alaska and the Northwest Territory of Canada.

Transportation and Commerce. In early days, travel in Washington was by Indian trails and on waterways. Sailing ships brought many of the pioneers, and from 1850 to 1870, steamboats carried gold seekers up the Columbia River to the diggings. Other gold prospectors reached the interior by stagecoaches, and traveled over rough Indian trails. Washington was the last United States territory to be crossed by a transcontinental railroad. In 1883 the Northern Pacific was finished across eastern Washington, and in 1887 its line was extended across the Cascade Mountains to Tacoma. Today, the state has more than 5,500 miles of railways. The Great Northern Tunnel through the Cascades, which was completed in 1929, is the longest (7.79 miles) in the Western Hemisphere.

Washington has an excellent system of highways, including several paved roads which cross the Cascade Mountains. A floating concrete pontoon bridge across Lake Washington is $1\frac{1}{4}$ miles long and the largest of its kind in the world.

The first air-mail service connecting the United States and Canada began to operate between Seattle and Victoria in 1920. Since then air transportation has grown rapidly. During World War II, air routes to Canada and Alaska, by way of Washington airports, were of the greatest importance. The chief airports are at Seattle, Spokane, Tacoma, Wenatchee, Pasco, and Walla Walla.

The Columbia River can be sailed as far inland as Wallula and Pasco. A few boats also travel up its branch, the Snake River, to Lewiston, Ida. Many steamship lines operate from the western coast, especially from Seattle and Tacoma. Grays Harbor is the largest lumber-shipping port of the world. Ocean-going vessels use a canal and locks which connect Puget Sound with Lake Washington. Ferryboats connect the various ports and islands of the Sound.

Press and Radio. The first newspaper in Washington was the *Columbian*, established in 1852. The first daily paper was the *Pacific Tribune*, printed at Tacoma in 1874. Today there are about 250 newspapers (of which more than 200 are published weekly) and about 85 periodicals in the state.

The first scheduled radio broadcasts in Washington were made in 1921 by two Seattle stations. One was operated by the newspaper, the *Post Intelligencer*, and the other by the Y.M.C.A. schools. Today the most important stations in Washington are located at Seattle, Spokane, and Tacoma.

Social and Cultural Achievements

Educational Institutions: *State Colleges of Education*, Eastern Washington at Cheney, established in 1890, Central Washington at Ellensburg, 1891; Western Washington at Bellingham, 1893. *Other Colleges and Universities*, University of Washington; Gonzaga University; State College of Washington; College of Puget Sound; Holy Names, Pacific Lutheran, St. Martin's, Seattle, Seattle-

Pacific, Walla Walla, Whitman, and Whitworth colleges.

State Welfare, Correctional, and Penal Institutions: *Children*, schools for feeble-minded boys and girls at Buckley and Medical Lake; correctional and educational schools at Chehalis (boys) and Grand Mound (girls); a school for the deaf and a school for the blind at Vancouver (boys and girls). *Mentally handicapped*, hospitals at Fort Steilacoom, Medical Lake, and Sedro Wooley (the last also for narcotics). *Veterans*, a home (also for veterans' wives and widows) at Retsil; a home and colony at Orting. *Prison*, at Walla Walla. *Reformatory*, at Monroe.

Education. The first school in what is now Washington was opened at old Fort Vancouver in 1832 for the sons of employees of the Hudson's Bay Company. In 1833, a school for Indians was opened in eastern Washington near the site of present-day Spokane. In the late 1830's, other Indian schools were opened by the famous American missionaries, Dr. Marcus Whitman and his wife, Narcissa; Cushing Eells; and Elkanah Walker. Soon after, other missionaries opened schools for the children of white settlers. Later, log schoolhouses also served as meetinghouses, courthouses, and town halls.

As early as 1854, the first territorial laws provided for public schools for all children between four and twenty-one years of age. But a state-wide system of public schools did not really begin until 1895. Today, the school system is administered by a state superintendent and a state board of education. Attendance has been required since territorial days for children between the ages of six and sixteen. Schools are required to operate at least 180 days out of each school year. Consolidated schools are rapidly increasing, and free transportation is provided under certain conditions. Education is provided for the mentally and physically handicapped.

Accredited colleges and universities of Washington are discussed under their own names in *THE WORLD BOOK ENCYCLOPEDIA*. For a list of these schools, see the *Related Subjects* at the end of this article.

Libraries. Washington has about a hundred public library systems. Several counties send bookmobiles to communities which do not have local libraries. The state library at Olympia started with a collection of books that were brought to Washington by way of Cape Horn in 1854. It contains many rare historical books and relics. The state also maintains a law library at Olympia. The Henry Suzzallo Memorial Library of the University of Washington has several famous collections, including those pertaining to the history of the Pacific Northwest, Alaska, and the fisheries industry.

Arts and Crafts. The State Museum on the campus of the University of Washington preserves examples of the art and handicraft products of the early Indians and pioneers. Several other museums which display relics of early periods include the Eastern Washington State Historical Society at Spokane and the Western Washington Historical Society at Tacoma. The Society of Seattle Artists, which was started in 1907, held the first annual display of Northwestern art.

Among the Washington authors who have won national fame are Ella Higginson, Edmond S. Meany, Henry Suzzallo, and Anna Louise Strong, who became editor of the *Moscow Daily News* in Russia and the author of several books about the Soviet Union and China. Owen Wister wrote his famous novel, *The Vir-*

WASHINGTON

AVERAGE YEARLY VALUE OF LEADING PRODUCTS

EACH DISK REPRESENTS \$1 MILLION DOLLARS
DISKS REPRESENTING FACTORY PRODUCTS INDICATE VALUE ADDED TO MATERIALS IN THE FACTORY

FARM AND SEA

DAIRY PRODUCTS

WHEAT

APPLES

HAY

EGGS

CATTLE, CALVES

FISH

MINE

COAL

SAND AND GRAVEL

STONE (CRUSHED)

GOLD

FACTORY (PLANTS AND MILLS)

LOGGING AND SAWMILLS

WOOD PULP

PAPER

NEWSPAPERS AND PERIODICALS

CANNED FRUITS AND VEGETABLES





RYMWOOD

PLANING MILLS

FLOUR

NOTE: AIRCRAFT, ALUMINUM, MAGNESIUM AND SHIPS ARE ALSO LEADING PRODUCTS. FIGURES ARE NOT DISCLOSED.

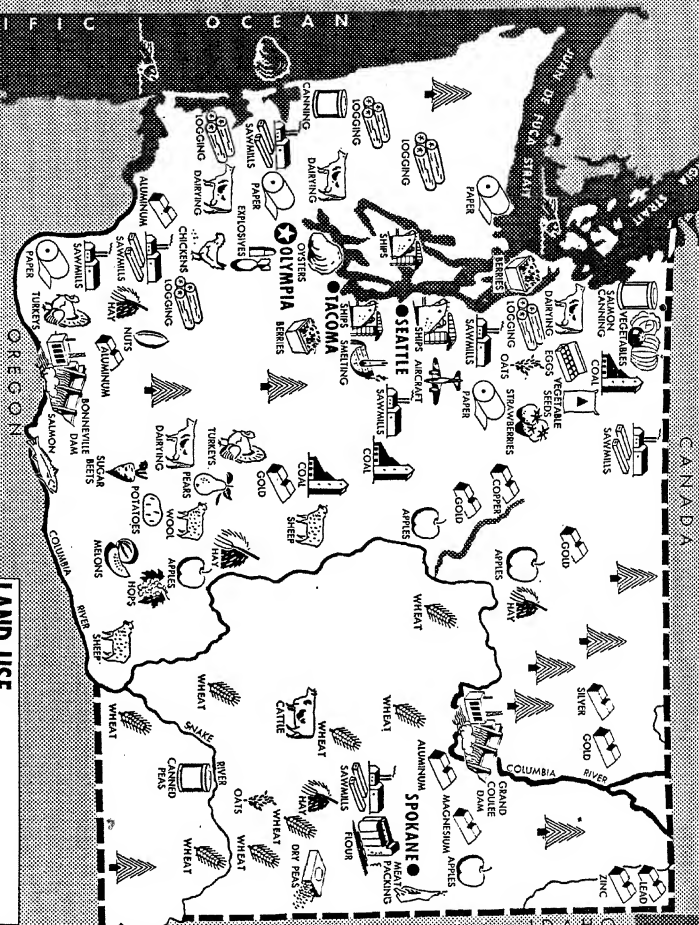
LAND USE

			
CROPS	PASTURE	FORESTS	OTHER
14%	29%	56%	1%

LEADING PRODUCTS AND INDUSTRIES

SOME PRODUCTS ARE OF STATE-WIDE IMPORTANCE
THE SYMBOLS ON THE MAP INDICATE LEADING AREAS ONLY

Based on latest U.S. Government statistics; prepared for the exclusive use of the WORLD BOOK ENCYCLOPEDIA by Photograph Corporation



inian, while he was a resident of Okanogan County.

The French Canadians who paddled the canoes of the early fur traders were the first to sing the music of the white man in Washington. Today, the state has several outstanding musical organizations. The best-known is the Seattle Symphony Orchestra. Washington singers include Helen Jepson and Patrice Munsel.

Religion. In 1831 four Nez Percé Indians traveled all the way from the Washington country to St. Louis to ask for copies of the Bible. In answer to their request, numerous missionaries went to Washington and set up churches and schools. They also taught the Indians to irrigate the land and encouraged others to settle in Washington, which helped to establish the claim of the United States to this region. In 1836 Dr. Marcus Whitman and his wife, H. H. Spalding, and W. H. Gray arrived. They established missions for the board of missions of the Congregational, Presbyterian, and Dutch Reformed churches at Waiilatpu, near present-day Walla Walla, and at Lapwai, on the Clearwater River. In 1838 Cushing Eells and Elkanah Walker founded another mission at Tshimakain, north of what is now Spokane. In the same year, Fathers François N. Blanchet and Modeste Demers held the first Mass in this part of America at Vancouver. In 1840 Blanchet established the first Roman Catholic mission on Whidbey Island.

The largest groups among the religious faiths of Washington today are the Roman Catholic, Methodist, Presbyterian, Lutheran, Baptist, Disciples of Christ, and Episcopal. There are two Russian Orthodox churches and three Buddhist temples in the state.

Social Welfare. Washington was the first state to pass a compulsory state insurance law in 1911. Other laws promoting social welfare provide for workmen's compensation; unemployment insurance; pensions for the aged, the blind, and for needy mothers; retirement funds for teachers and certain other state employees; and aid to dependent and crippled children.

In addition to a state Department of Health, many counties and cities have public health nurses and provide clinics and hospitals for the needy. The King County Hospital, which was opened at Seattle in 1931, is one of the best of its kind in the United States. The Orthopedic Hospital, also in Seattle, provides treatment for thousands of children of the Northwest, Alaska, and even Hawaii.

Recreation and Outdoors

Puget Sound has a long shore line and numerous islands, bays and sandy beaches along the Pacific, and many inland lakes and streams. These features provide excellent opportunities for boating, fishing, and swimming. Salmon-fishing derbies are common, and the state is noted for its fine oarsmen, or rowers. The mountains and forests attract hunters, campers, hikers, mountain climbers, and skiers. Cowboy rodeos and lumberjacks' logrolling contests are still popular.

National Parks, Monuments, and Forests. Some of the most scenic areas of the state have been set aside in Mount Rainier and the Olympic national parks. The Federal Government has also established a national monument where Marcus Whitman's mission stood.

The seven national forests that lie entirely within the state are the Chelan (1,812,665 acres), Columbia (1,261,294 acres), Mount Baker (1,816,675 acres), Snoqualmie (1,182,322 acres), and Wenatchee (1,138,764 acres), in the Cascade Mountains; the Olympic (640,005 acres), in the Olympic Mountains; and the Colville (749,813 acres), in the Northeastern Highlands. The state also shares the Kaniksu National Forest with Idaho, 644,898 acres of the forest being in Washington. The Umatilla National Forest, in the Blue Mountains, is shared with Oregon, and 313,359 acres are in Washington.

State Parks. Larabee, near Bellingham, was created in 1915, as the first state park. Since then, Washington has set aside more than fifty-five state parks, with a total area of nearly 50,000 acres. They include:

Beacon Rock (3,154 acres), near Bonneville Dam. Named for a huge lava rock, which was once used as a natural beacon or lighthouse for sailors on the Columbia River. It is about 900 feet high and rises straight above the river. Only the Rock of Gibraltar in the Mediterranean is larger. Created, 1935.

Deception Pass (1,986 acres), on Whidbey and Fidalgo islands. Famous for its scenic hills, cliffs, ravines, freshwater lakes, and salt-water beaches. Named for Deception Pass, a narrow, four-mile-long channel between the islands, through which the water rushes with mighty force. The pass itself was named in 1792 by George Vancouver, the English explorer, who had first thought it to be a closed harbor. Created, 1922.

Dry Falls (480 acres), near Coulee City. Noted for the gigantic canyon and beds of five horseshoe falls with a total height of 420 feet, which were carved by the Columbia River ages ago and left dry when a glacier changed the course of the river. Excellent views of the Grand Coulee Dam and reservoir may be had from this point. Created, 1933.

Ginkgo Petrified Forest (6,500 acres), near Ellensburg. Contains many petrified logs and leaves that were buried millions of years ago beneath melted lava and turned to stone. Also contains a group of crude rock carvings and pictures made by prehistoric Indians. Created, 1934.

Moran (5,035 acres), on Orcas Island of the San Juan group. An excellent view of Puget Sound and part of British Columbia may be obtained from Mount Constitution. Created, 1920.

Mount Spokane (16,000 acres), near Spokane. Year-round recreational center, which attracts hikers and fishermen in summer and skaters and skiers in winter. Excellent views of the mountains, lakes, and forests of eastern Washington, and parts of British Columbia and Idaho. Created, 1934.

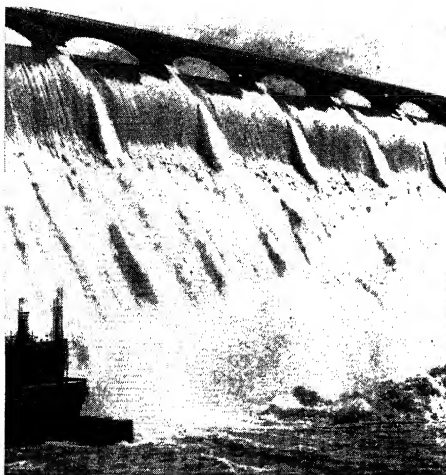
Riverside (4,500 acres), near Spokane. Noted for such formations as the Bowl and Pitcher Canyon of the Spokane River, and for the fossil remains found in Deep Creek Canyon. Created, 1934.

Sacajawea (19.75 acres), near Pasco. Historical site named for the Indian woman who helped guide the Lewis and Clark Expedition to the spot where the Snake and Columbia rivers meet. A museum contains many Indian relics. Created, 1923.

Samuel Hill Memorial (7 acres), near Blaine. Named for a great road builder and businessman. This landscaped spot contains the United States part of the Peace Arch, which was built to celebrate more than 100 years of peace between Canada and the United States. The Canadian Peace Arch Park is joined to it. Created, 1931.

Other Interesting Places to Visit which attract many visitors to Washington each year include:

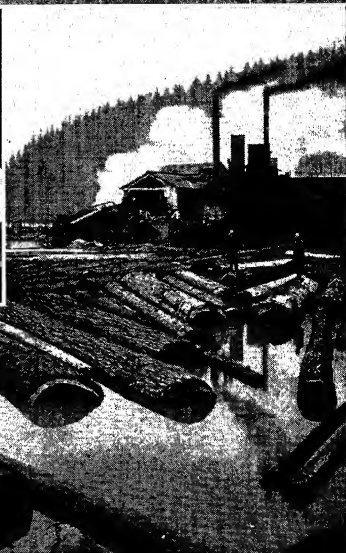
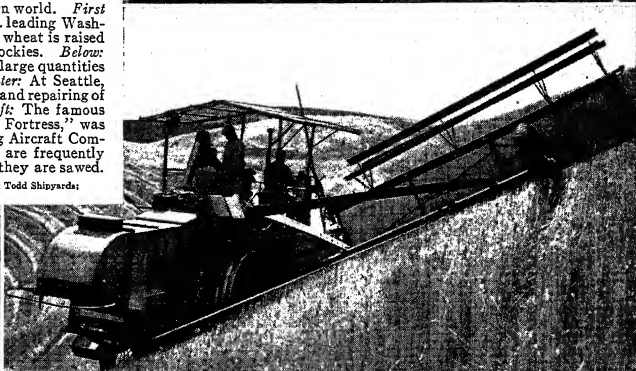
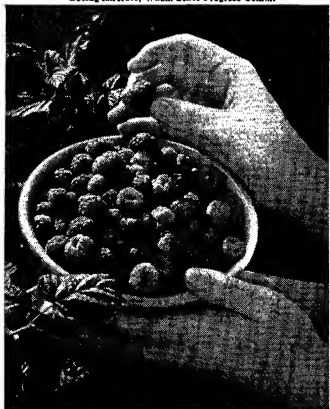
Fort: *George Wright*, at Spokane. Important Army post, established in 1894. *Lawton*, Seattle. Large Army post



PRODUCTS AND INDUSTRIES

Above: A section of the spillway of Grand Coulee Dam, one of the wonders of the modern world. *First right:* Salmon fishing and canning is a leading Washington industry. *Second right:* More wheat is raised than in any other state west of the Rockies. *Below:* In the valleys of western Washington, large quantities of raspberries are grown. *Below center:* At Seattle, Tacoma, and Bremerton, the building and repairing of ships is a major industry. *Third left:* The famous B-17E, better known as the "Flying Fortress," was first designed and built by the Boeing Aircraft Company at Seattle. *Third right:* Logs are frequently floated down river to the mills where they are sawed.

Photos: U. S. Dept. of Interior; J. I. Case; John Barry; Todd Shipyards; Boeing Aircraft; Wash. State Progress Comm.



located on a bluff overlooking Puget Sound; established in 1897. *Lewis*, south of Tacoma. One of the largest Army training camps of the Northwest during World Wars I and II. *Simcoe*, near Yakima. Famous for its blockhouse, built in 1856. *Young Hill Blockhouse*, on San Juan Island. Britain's last hold in any part of what is now the United States.

Lewis and Clark Monument, Long Beach. Marks the end of the north-coastal explorations of the Lewis and Clark expeditions. The monument is made of many-colored stones contributed by communities along the route.

Maryhill Castle, Maryhill Junction. Art museum in a mansion built by Samuel Hill on a high bluff overlooking the scenic Columbia River Gorge. It was dedicated by Queen Marie of Rumania in 1926.

Stonehenge, near Maryhill Junction. A World War I memorial modeled after the picturesque ruins on Salisbury Plain, England. Donated by Samuel Hill.

Whitman Museum, on the campus of Whitman College, Walla Walla. Contains relics of the explorations and settlements of the Pacific Northwest, including articles that were owned by Marcus Whitman and his wife.

Government

National: Electoral votes, 8. Representatives in Congress, 6.

State: Senators, 46; representatives, 99. *Capital*, Olympia (since 1853).

Counties: 39.

Washington is governed under its original constitution which was adopted in 1889. Since then, it has often been amended. The initiative and referendum have been in force since 1912, but they do not apply to constitutional amendments. The recall applies to all elected officials except county and state judges.

Executive officers are a governor, lieutenant governor, secretary of state, treasurer, auditor, attorney general, superintendent of schools (elected by nonpartisan ballot), insurance commissioner, and commissioner of public lands. They are elected for four years.

The governor appoints the directors of fifteen departments and commissions. These are adjutant general, business finance and budget, highways, public prints, unemployment compensation and placement, social security, public service, state patrol, health, conservation and development, labor and industries, agriculture, taxation and examination, licenses, and fisheries and game.

Legislative power is vested in a legislature, made up of a senate and a house of representatives. Senators are elected for four years, and representatives for two years. Both houses meet in odd-numbered years.

Judicial decisions are made by a supreme court of nine judges, elected for six years; by county superior courts, headed by one or more judges elected for four years; and by justice-of-the-peace courts in rural districts, with justices elected for four years.

Local Government operates with the county as a unit. In all but two counties, both executive and lawmaking power is given to a board of commissioners, with three members elected for four years. Spokane and Whatcom counties are organized into townships, and each has an elected board of supervisors.

National Politics. In 1912 Washington cast its electoral votes for the candidates of the Progressive party. Except for this election, the state has voted for the Republican party about half of the time, and for the Demo-

cratic party the rest of the time. See **POLITICAL PARTY** (chart).

Famous Men and Women

Several famous Washingtonians have separate biographies (see Biographies in the list of *Related Subjects* at the end of this article). Others who have won state, national, or international fame include:

Bryan, Enoch Albert (1855-1941), born at Bloomington, Ind. Educator who was for many years president of the State College of Washington at Pullman. Author of various books on politics and economics.

Denny, Arthur A. (1822-1899), born at Salem, Ind. One of the first settlers of Seattle, who led a wagon train of pioneers across the country from Illinois. He played a leading part in the development of Seattle, by working for advanced state laws, and in encouraging social and industrial progress in Washington. Author of *Pioneer Days on Puget Sound*.

Eells, Cushing (1810-1893), born at Blandford, Mass. One of the earliest missionary leaders in the Washington country. He helped to establish missions and schools. In 1859 he founded a seminary at Walla Walla in memory of the heroic Marcus Whitman. The school later was called Whitman College.

Ferry, Elisha Peyre (1825-1895), born at Monroe, Mich. Lawyer who served as governor of Washington Territory from 1872 to 1880 and as the first governor of the state, from 1889 to 1893.

Gould, Carl F. (1873-1939), born in New York City. Noted architect of the Northwest who helped design the campus and buildings of the University of Washington.

Higginson, Ella R. (1862-1939), born in Kansas. Poet, novelist, short-story writer, and historian of the Northwest. Many of her poems have been set to music.

Hill, Samuel (1857-1931), born at Deep River, N.C. Pioneer promoter of good roads and famous road builder who gave funds for the construction of the International Peace Arch which was built near Blaine in 1914. He tried to found a Belgian settlement in the Columbia Gorge, but it failed. The palace which he built there became the Maryhill Museum in 1926.

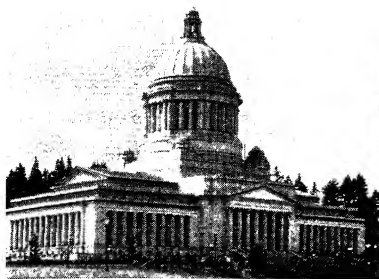
Landes, Bertha Knight (1868-), born at Ware, Mass. Civic leader and mayor of Seattle from 1926 to 1928. She was the only woman to have been mayor of a major city of the United States.

Meany, Edmond S. (1862-1935), born at East Saginaw, Mich. Historian and distinguished professor of history at the University of Washington, where a building is named in his honor.

Ross, James Delmage (1872-1939), born at Chatham, Ontario, Canada. Electrical engineer who was largely responsible for the location of the Skagit-Diablo Dam, which he helped to build. Later, he became administrator of the Bonneville project. Well known as a leader and authority on power problems, he was called upon for advice during the administration of Franklin D. Roosevelt.

Stevens, Isaac Ingalls (1818-1862), born at Andover, Mass. First governor of Washington Territory, he became famous for his work in making treaties with the Indians, and won about 100,000 acres of land for the United States. He also surveyed a northern route for a transcontinental railway to the Pacific, and served as the territorial delegate to the national Congress in 1857. He was a high-ranking officer of the Union Army during the War between the States.

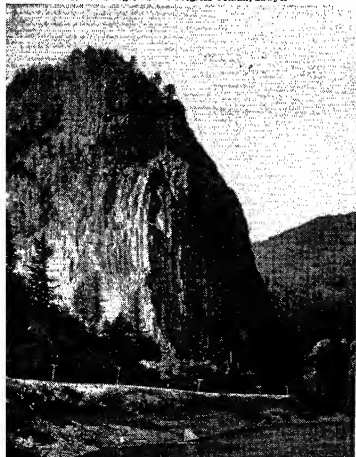
Suzzallo, Henry (1875-1933), born at San Jose, Calif. Outstanding educator in California, New York, and elsewhere, he served as president of the University of Washington from 1915 to 1926 and as president of the Carnegie Foundation for the Advancement of Teaching (1930-1933). He was the author of various well-known textbooks.



SCENIC WASHINGTON

First left: The State Capitol at Olympia. *First right:* Beautiful Eunice Lake in Mount Rainier National Park. *Above:* San Juan Islands in Puget Sound. *Second right:* The mountain streams and lakes are a paradise for trout fishermen. *Below:* Beacon Rock on the Columbia River, rising almost perpendicularly to a height of about 900 feet, is the second largest monolith known. *Third right:* Large nurseries at Puyallup raise many fields of daffodils.

Photos: Washington State Progress Comm.; Sawyer



State Symbols and Events

State Seal: The date 1889, below the portrait of George Washington, stands for the year in which the state constitution was adopted.

State Flag: The state seal (see right) on a dark green field. See **FLAG** (color plate, Flags of the States).

State Motto: *Al-ki*, an Indian word meaning *Bye and Bye*.

State Bird: Goldfinch. See **BIRD** (color plate, State Birds).

State Flower: Coast rhododendron. See **FLOWER** (color plate, Common Garden Flowers).

State Tree: Western hemlock.

State Song: "Washington Beloved." Words by Dr. Edmond S. Meany; music by Reginald de Koven.

Annual State Events. Among the interesting events on the state calendar are:

Treaty Day Powwow, at Lummi, Swinomish, and Tulalip Indian reservations, January 22.

Inland Empire Stock Show, Spokane, in February.

Mountaineers' Twenty-Two-Mile Ski Patrol Race, Snoqualmie Pass, March 3.

Rhododendron Festival, Port Townsend, April 26-27.

Puyallup Valley Daffodil Festival, Tacoma, Sumner, and Puyallup, in April (no fixed date).

Silver Skis Championship, Mount Rainier, third week in April.

Apple Blossom Festival, Wenatchee, in May.

Strawberry Festival, Bellevue, in June.

Salmon Fishing Derby, Tacoma, in June (no fixed date).

Lake Chelan Rodeo, Chelan, last week in July.

Pacific International Yacht Association Regatta, July 1-5.

Fleet Week, Seattle, third week in July.

Puget Sound-Nanaimo, British Columbia, Power Boat Race, in July.

Air Show, Boeing Field, Seattle, August 14.

State Gladioli Show, Bellingham, in August.

Salmon Fishing Derby, Seattle, September 11; Port Angeles, Labor Day.

State Day, state-wide, November 11.

History

1578 Francis Drake visited the Pacific Northwest coast.
1775 Hecata and Quadra landed on Washington coast.
1776-1778 James Cook mapped the Pacific Northwest coast.

1792 Robert Gray discovered Grays Harbor and the Columbia River. George Vancouver surveyed the coast.

1805 Lewis and Clark Expedition reached the Pacific.

1811 Fort Okanogan built by the Americans.

1818 England and United States agreed to occupy the Oregon country together.

1825 Dr. John McLoughlin founded Fort Vancouver.

1836 Dr. Marcus Whitman founded Waiilatpu Mission.

1846 Boundary dispute between Great Britain and the United States settled.

1851 First settlers arrived at Alki Point, now Seattle.

1853 Washington Territory created.

1883 First transcontinental railway crossed Washington.

1889 Washington admitted to the Union.

1897-1898 Rush to the Klondike and Alaska gold fields.

1909 Alaska-Yukon-Pacific Exposition held at Seattle.

1917 Lake Washington Ship Canal opened.

1928 Capitol at Olympia completed.

1941 Grand Coulee Dam completed; Washington shipyards and industries enlarged to meet wartime demands.

1945 Washington industry returned to peacetime production.



Indian Days. The white explorers and settlers found more than seventy Indian tribes living in the Washington country. Those who lived on the plains and in the river valleys east of the Cascades were known as the Horse Indians because they used ponies to carry their wickiups (huts) and tepees as they moved from place to place. The Spokane, Nez Percé, Colville, Okanogan, Yakima, and Cayuse were the chief tribes among the Horse Indians. The so-called Canoe Indians lived west of the Cascade Mountains. Most of them lived in long houses, made of bark or rushes in summer, and of cedar planks in winter. Among these coastal tribes were the Clallam, Nisqually, Puyallup, Chinook, Clatsop, and Nooksack.

Discovery, Exploration, and Settlement. The first white men to see the Pacific Northwest were Sir Francis Drake and his seamen. They sailed up the coast in 1578 and saw Puget Sound. Apostolos Valerianos, a Greek captain hired by the Spaniards, probably sailed along the coast in 1592. The Spaniards called the Greek captain Juan de Fuca, but he probably did not reach the strait which bears his name. In the 1700's the Russians began to send their explorers and fur traders to North America. Spain was afraid that these newcomers would establish claim to the region, and sent out several expeditions. In 1774 Juan Perez saw Mount Olympus, and in 1775 Bruno Hecata and Juan Francisco de la Bodega y Quadra made the first landing on Washington soil, near present-day Point Grenville. They claimed the region for Spain.

The English also sent out several explorers, including Captain James Cook. Between 1776 and 1778, Cook mapped much of the coast while he searched for the fabled Northwest Passage. Later, Charles William Barkley found the passage which is now called Juan de Fuca Strait. Captain George Vancouver made a careful survey of the coast, between 1792 and 1794, and named many of the peaks, capes, bays, islands, and channels.

Captain Robert Gray, an American who was the head of a fur-trading expedition sent out by a Boston company, discovered the harbor now known as Grays Harbor and the Columbia River in 1792. Gray established the American claim to the region with this discovery. Soon after, the United States sent out its first naval expedition to explore Puget Sound. In 1805, Lewis and Clark sailed down the Snake and Columbia rivers to the Pacific. Between 1807 and 1811, the British strengthened their claim when David Thompson, the great explorer and geographer, sailed down the Columbia from Kettle Falls to the Pacific Ocean.

In 1810 a British fur company established the first white settlement in the region, near what is now Spokane. In 1811, John Jacob Astor's company founded Fort Okanogan near the place where the Okanogan and Columbia rivers meet. Various other rival fur-trading posts soon followed. During the War of 1812, the American companies were forced out, and the British gained control. John McLoughlin of the Hudson's Bay Company founded Fort Vancouver on the north bank of the Columbia River in 1825, and the British claims became even stronger. Although McLoughlin was master of the area for a time, the founding of such American missions as Waiilatpu by the Whitmans in 1836 strengthened the

claim of the United States. Neither country was willing to withdraw, so in 1818 the two nations agreed to a treaty that allowed them to occupy the area together. After the United States presidential campaign of 1844, the boundary dispute between them became bitter. "Fifty-four Forty or Fight" became the rallying cry of the campaign. The numbers referred to the degree of latitude which the Americans wished to establish as the northern boundary. In 1846 a treaty was signed, which set the present northern boundary.

Territorial Days. In 1848 Washington became part of the Oregon Territory, but five years later, it was separated and organized as a separate territory. In 1863, Idaho territory was formed, which left Washington with its present boundaries. Increasing numbers of settlers entered the territory after 1860, partly because of the discovery of gold in Idaho, Oregon, and British Columbia. Soon afterward, cattle were brought in and flourished on the grass of the open range in eastern Washington.

Statehood and Growth. Washington was admitted to the Union as the forty-second state in 1889, soon after the state had been connected with the East by rail. A progressive constitution was adopted. By 1900 most of the open cattle range had disappeared, and wheat fields and orchards took its place. Lumbering, fishing, and mining also increased rapidly, and shipping with the Far East and Alaska became a leading industry. The shipping industry added to the wealth of the ports and railway centers. The state also profited greatly by the Klondike and Alaska gold rush of 1897-1898, and Seattle served as the chief outfitting center for the prospectors. In addition, much money was made handling Alaskan products. The scientific development of irrigation made farming more and more important. After Washington had been a state for only twenty years, it attracted the attention of the nation with the Alaska-Yukon-Pacific Exposition, which was held at Seattle.

During World War II, the state's industries, especially its great aircraft factories and shipyards, enlarged rapidly to meet the needs of the Allies. The state also served as an important military training center. O.W.F.

Related Subjects. The reader is also referred to:

BIOGRAPHIES

Boeing, William Edward	Munsel, Patrice
Crosby, "Bing," Harry Lillis	Taggard, Genevieve
Handforth, Thomas	Wainwright, Jonathan M.

CHIEF PRODUCTS

Apple	Halibut	Salmon
Apricot	Hop	Sandstone
Blackberry	Lumber	Shingles
Cherry	Pear	Strawberry
Cranberry	Raspberry	Wheat
Fruit and Fruit Growing		

CITIES

Bellingham	Olympia	Tacoma
Bremerton	Richland	Vancouver
Everett	Seattle	Walla Walla
Hanford	Spokane	Yakima

COLLEGES AND UNIVERSITIES

Gonzaga University	Pacific Lutheran College
Holy Names College	Puget Sound, College of

St. Edward's Seminary	Washington, State College of
St. Martin's College	Washington, University of
Seattle College	Washington College of Education
Seattle Pacific College	Whitman College
Walla Walla College	Whitworth College

HISTORY

Gray, Robert	Oregon (History)
Indian, American (Northern Fishermen)	Pioneer Life
Lewis and Clark Expedition	Whitman, Marcus

PHYSICAL FEATURES

Cascade Range	Olympic Mountains
Coast Range	Puget Sound
Columbia River	Rainier, Mount
Fairy Falls	Snake River
Juan de Fuca Strait	

UNCLASSIFIED

Bonneville Dam	San Juan Islands
Chinook	United States of America
Diablo Dam	(color plates, Farm Scenes [Wheat Harvest]; Majestic Mountain Peaks [Mount Rainier]; Picturesque Coastal States [Modclips Beach]).
Food (Famous Foods of the States)	
Grand Coulee Dam	
Olympic National Park	
Puget Sound Navy Yard	

Books for Younger Readers

BENNETT, RICHARD. *Mister Ole*. Doubleday, 1940. An old Swedish sailor settles near the O'Briens on a clearing not far from Puget Sound. *Skookum and Sandy*, 1935. Adventures of Sandy and his goat Skookum in a lumber village of the Pacific Northwest.

CARR, MARY JANE. *Young Mac of Fort Vancouver*. Crowell, 1940. A boy's life in the trading post at old Fort Vancouver during the 1830's.

MEEKER, EZRA. *Ox-Team Days on the Oregon Trail*. World Book Co., 1924. Interesting story told by one of the most famous pioneers of the Northwest.

Books for Older Readers

BINNS, ARCHIE. *The Roaring Land*. McBride, 1942. Interesting story of Washington.

JONES, WARD. *Evergreen Land*. Dodd, 1947.

McKAY, ALLIS. *They Came to a River*. Macmillan, 1941. Novel based on the life of a woman who grew up in the apple country.

MEANY, EDMOND STEPHEN. *History of the State of Washington*. Macmillan, 1941.

ROSS, NANCY WILSON. *Farthest Reach; Oregon and Washington*. Knopf, 1941. History and description.

Washington, a Guide to the Evergreen State. Binfords, 1941. (American Guide series.) Historical and factual data on the state.

An Outline suitable for Washington will be found with the article "State."

Questions

How do eastern and western Washington differ in (a) temperature; (b) rainfall; (c) industries?

What is the most thickly populated section of Washington? What has made it so?

Where are the chief lumbering areas of Washington?

Where is the fishery industry centered? What fish are its chief products?

Where are the chief wheat-growing areas? What type of farming makes wheat growing possible in this area?

What factors help to make Washington a great shipping center? On what bodies of water are the chief ports located?

What part did each of the following play in Washington history: George Vancouver, Robert Gray, John McLoughlin, Marcus Whitman, Arthur Denny, Cushing Eells?



WASHINGTON, D.C. (population 663,091). The capital of the United States is one of the most beautiful and impressive of the world's centers of government. Washington shares importance with London and Moscow as a world capital. The policies that are set for the Federal Government in Washington can influence not only the daily lives of the people of the United States, but also the lives of peoples in remote parts of the world. In Washington, the Congress debates bills and adopts the nation's laws. Here sit the nine black-robed justices of the Supreme Court, who make final decisions on matters of justice. Here the President of the United States and members of the executive departments of the Federal Government carry out the provisions of the national laws.

About one out of every three workers in Washington is an employee of the Federal Government. The government workers range from members of the President's Cabinet to the lowest-paid clerical workers. The people of Washington have come to the capital from farms, villages, and great cities throughout the United States and its territories and possessions. In peace and in war, these workers man the Federal agencies that make up the nation's nerve center.

In population, Washington ranks eleventh among the cities of the United States. The city has more telephones per person than any other city in the world, and is the world's greatest user of long distance and overseas telephone facilities.

The Washington of today, with its beautiful buildings and wide, crowded streets and avenues, is very different from the Washington of 1800. When Thomas Jefferson rode horseback to his inauguration as President in that year, the nation's capital was little more than a village. Jefferson rode down muddy lanes and tied his horse to a log fence before the uncompleted Capitol. Today, new Presidents ride down Pennsylvania Avenue, one of the

WASHINGTON, D.C.

most famous streets in the world, while flags fly, bands play, and crowds cheer. The inauguration parade ends at the White House, the home of the President.

Visitors come from all parts of the world to see the impressive Capitol, the famous Washington Monument, the Lincoln Memorial, and the beautiful Tidal Basin of the Potomac River, which is lined with Japanese cherry trees.

Location, Size, and Description

The capital of the forty-eight states is not situated in any of them, but in the District of Columbia. Washington has the same boundaries as the District of Columbia, which covers seventy square miles of land. At one time this area was part of Maryland and of Virginia. Washington occupies the land between Rock Creek and the Anacostia River. Both these streams empty into the Potomac River, which forms the southwestern border of Washington. Washington lies about a hundred miles from the place where the Potomac empties into Chesapeake Bay. The city is 38 miles southwest of Baltimore, and 135 miles southwest of Philadelphia, Pa. New York City is 228 miles northeast of Washington, and Atlanta, Ga., is 648 miles to the southwest.

Unlike most other cities of the United States, the national capital did not develop in a higgledy-piggledy way, with little roads gradually being widened to become avenues, and crooked lanes gradually straightening into streets. This spot was chosen for the capital when George Washington was President. Major Pierre Charles L'Enfant, a famous French engineer, was hired to draw plans for the city. He chose a plan in which streets would cross each other to form squares as regular as a checkboard. Only a few principal avenues broke up this regular design. All the streets and avenues began at a central point. For this, Major L'Enfant chose a flat-topped hill, or plateau, only 83 feet above the Potomac River.

The plateau, known as Capitol Hill, is high enough to lift the Capitol above the less important government buildings and the homes and churches of the city. Three important streets run from Capitol Hill. These help divide the city into four sections. The streets are North Capitol, East Capitol, and South Capitol. The other dividing line is an imaginary one stretching west from the Mall. The Mall is a wide stretch of walks, parks, and gardens which run past the Washington Monument to the Lincoln Memorial. The sections for which the Mall and the main streets are the dividing line are called the Northeast, the Southeast, the Northwest, and the Southwest.

The names of the four sections are usually abbreviated to N.E., S.E., N.W., and S.W. The streets running north and south in these districts have numbers instead of names. The streets running east and west have letter for names. The exact location of a street is indicated by the section abbreviation, such as D Street, N.W. The numbered and lettered streets are crossed diagonally by avenues. The avenues are named for the various states of the Union.

Pennsylvania Avenue is four and a half miles long. It is broken by the grounds of the White House, the Capitol, the Treasury Building, and many small parks.

The streets on which the embassies and legations of foreign countries are located are especially colorful. These usually have the flags of their country flying over the buildings, and also show their national coat of arms. Embassy Row has the embassies of The Netherlands, Lithuania, Cuba, Poland, France, Italy, Spain, and Mexico. On Sheridan Circle are the embassies of Egypt, Turkey, Rumania, Sweden, Colombia, Chile, Iran, Austria, and Czechoslovakia. The British embassy, on Massachusetts Avenue, is like an English manor house of the days of Queen Anne.

Cultural Life

Education. Washington is the home of George Washington University, Georgetown University, the Catholic University of America, American University, National University, Howard University, and Gallaudet College. The city is the home of the Carnegie Institution.

Libraries. There are more than two hundred libraries in Washington. The largest and most splendid is the Library of Congress. In a special marble shrine, protected by a railing and a guard, are the original parchment documents on which the Declaration of Independence and the Constitution of the United States were written. The Folger Shakespeare Library has many books about Shakespeare and his plays.

Scientific libraries in Washington include the medical library of the office of the United States Surgeon General, and the collections of the Weather Bureau, the Geological Survey, the Department of Agriculture, the Smithsonian Institution, the Bureau of Education, and

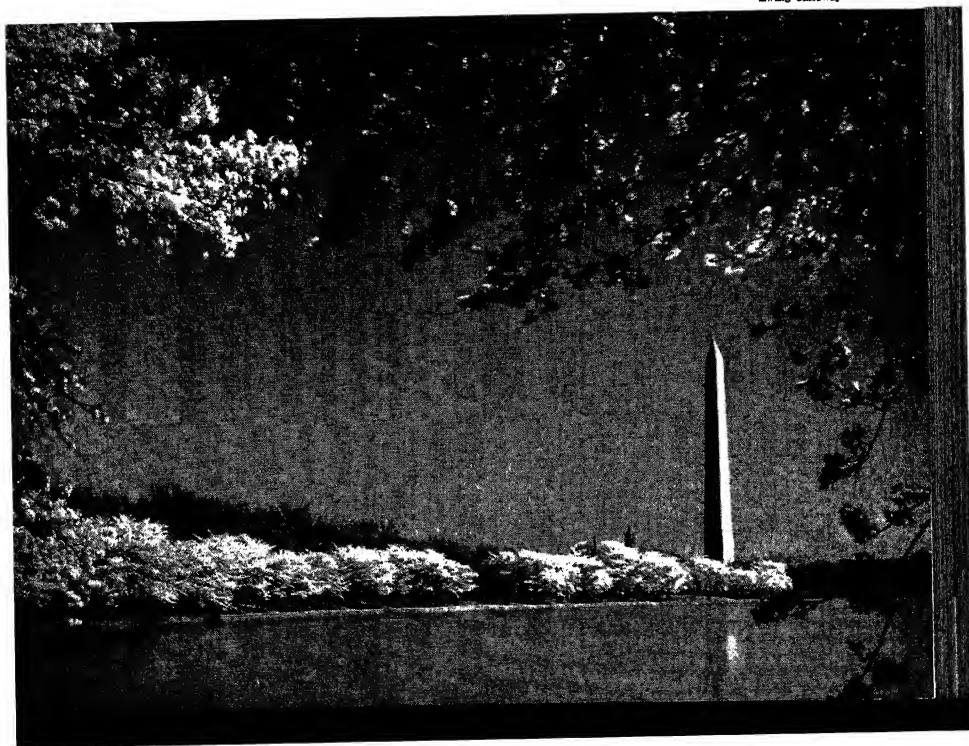
the Naval Observatory. Washington's main public library is a fine marble building on Mount Vernon Square. There are branch libraries throughout the city.

Art Galleries and Museums. The Corcoran Art Gallery, near the White House, is one of the oldest and best-known art institutions in the world. It was founded and endowed by William W. Corcoran, and was greatly enriched by a gift from the William A. Clark collection. The gallery's collection of American art is one of the best in existence. It also has outstanding examples of French and Dutch paintings, Gothic tapestries, Persian rugs, and Italian majolicas and antiquities. The art gallery conducts a free school with more than 700 students. The National Gallery of Art, opened in 1941, is one of the most beautiful buildings in Washington. It was given to the nation by Andrew W. Mellon, former Secretary of the Treasury. Another valuable art collection is maintained in the National Museum.

The Smithsonian Institution is a famous museum. Other noted museums in Washington include those of the National Academy of Sciences and the National Geographic Society, and the Natural History Building.

Churches. Of the many churches in Washington, there are three which people most often visit. The Cathedral of Saints Peter and Paul, on Mount Saint Albans, is where President Woodrow Wilson is buried. The cathedral also has a beautiful chapel especially for children. The National Shrine of the Immaculate Conception is on the campus of the Catholic University of America. Not far from this is the Franciscan Monastery, which has many beautiful chapels and catacombs.

The Washington Monument Is Mirrored in the Tidal Basin and Framed by Blossoming Japanese Cherry Trees
Ewing Galloway





Ewing Galloway

Three Gutenberg Bibles Printed on Vellum Are among the Most Prized Possessions of the Library of Congress

Parks and Playgrounds. The park system of Washington is made up of five large parks, and several hundred smaller areas which are used as playgrounds and athletic fields. Many small open spaces at the intersections of city streets are really small parks. So is the Tidal Basin, whose three sides are lined with thousands of Japanese cherry trees which are in bloom for almost a month during spring.

Rock Creek Park covers 1,600 acres of fields, forests, cliffs, bridle paths, footpaths, and bridges.

Zoological Park (109 acres) has mammals, birds, fish, and reptiles from all parts of the world.

East Potomac Park and *West Potomac Park* were once swamps, but their 737 acres have been drained of water and turned into playgrounds, golf courses, picnic grounds, and a tourist camp.

Washington Botanical Garden has an arboretum which includes cacti, orchids, palms, and other tropical shrubs and trees, and a bird sanctuary.

Important Buildings

Capitol. The Capitol with its huge white dome is not only the most impressive building in Washington. It is also the most important. Here the nation's policies are debated, laws are passed or defeated, foreign treaties are ratified, and money is appropriated to run the government. George Washington laid the cornerstone of the Capitol in 1793.

The Capitol was first considered completed in 1850, but it has been enlarged and modernized many times since then. In all, about \$26,000,000 has been spent on the Capitol and its grounds. Today, the five-story building covers about three and a half acres. White marble wings provide meeting chambers for the Senate and the House of Representatives.

The east front of the Capitol is decorated with stately columns and pilasters in the Corinthian style of architecture. The grand central portico is 160 feet wide and is lined with columns. On each side is a group of statues. In the center is a great bronze door designed by Randolph Rogers. This door opens into the Great Rotunda, which is more than ninety-five feet in diameter. There

are many statues and paintings, including four canvases painted by John Trumbull. Trumbull's paintings are unusually valuable, since he painted his scenes of the Revolutionary War from life, and used Jefferson, Washington, and other famous men as his models. Presidents who died in office lie in state in the Rotunda. So do other men thought worthy of this honor because of their service to the nation. On the canopy of the dome is the striking *Apotheosis of Washington*, painted by the Italian artist, Constantino Brumidi.

On each side of the Great Rotunda are two smaller rooms, also with domes. They are the North Small Rotunda and the South Small Rotunda. The North Small Rotunda is the oldest part of the Capitol.

Beyond the Great Rotunda is the Supreme Court Chamber. Its columns are of Potomac gray-green marble. Beyond the Supreme Court Chamber is the Senate Chamber, which has galleries extending around the four walls. All the Vice-Presidents since 1861 have been inaugurated under the great glass skylight of the Senate Chamber. The House Chamber is arranged like the Senate Chamber. The Speaker of the House sits on a marble platform. On a malachite stand at his right is the great mace of the United States — a bundle of thirteen black rods topped by a silver globe and an eagle. Both the Senate and the House of Representatives meet in the House Chamber when they join to listen to messages from the President of the United States.

Between the chambers of the Senate and the House is Statuary Hall. Each state is entitled to have a statue of its most distinguished citizen in this hall. See STATUARY HALL.

Adjoining the Capitol grounds on the north and south are the imposing marble buildings which hold the administrative offices of the Senate and the House of Representatives.

Federal Triangle. This group of twelve limestone government buildings is set in a triangle with the point at Sixth Street and the base lying along Fifteenth Street. Pennsylvania and Constitution avenues form the sides of the triangle. The buildings in the group include those of the Department of Commerce, the Department of Labor, Interstate Commerce Commission, Post Office Department, Department of Justice, National Archives, Federal Trade Commission, and Bureau of Internal Revenue. Of these, the National Archives is the most interesting

WASHINGTON, D.C.

METROPOLITAN DISTRICT

DISTRICT OF COLUMBIA

MARYLAND

VIRGINIA

Potomac River

Anacostia River

White House

Capitol

Pentagon

Washington National Airport

Georgetown

Bethesda Naval Hospital

Walter Reed Hospital

To Great Falls

To Baltimore

To Annapolis

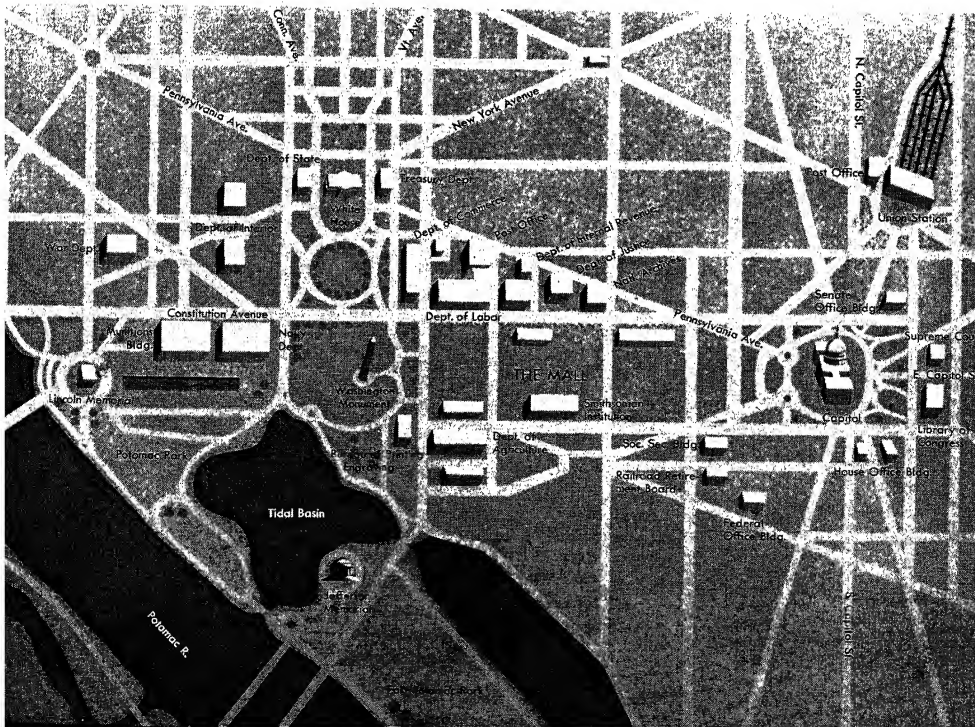
To Mt. Vernon & Alexandria

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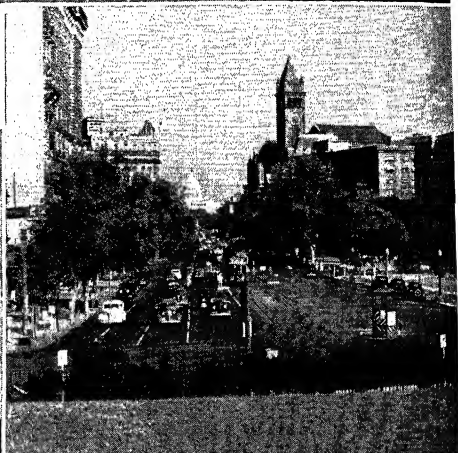
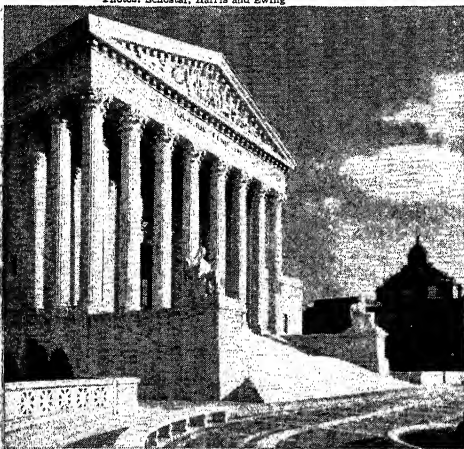


WASHINGTON, D. C.



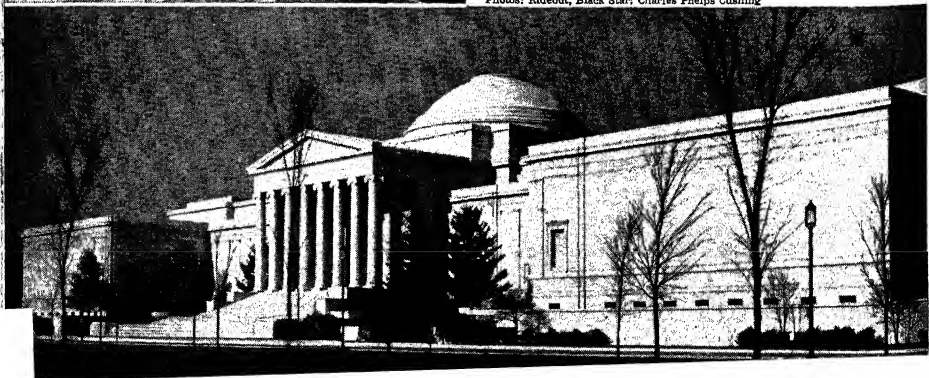
Washington, systematically laid out by Major L'Enfant at the request of George Washington, is considered one of the most beautiful cities of the world. From the Capitol, *above*, four main streets radiate, dividing the city into four sections. Close to the Capitol is the Supreme Court Building, *below*.

Photos: Schoostal; Harris and Ewing



Looking down Pennsylvania Avenue, *above*, towards the Capitol. The National Gallery of Art, *below*, was given to the nation by Andrew W. Mellon, former Secretary of the Treasury. The building is larger than the Capitol, and houses a large collection of valuable paintings and sculpture.

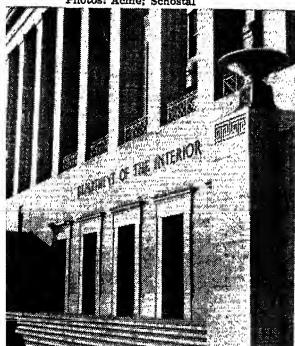
Photos: Rideout, Black Starr; Charles Phelps Cushing





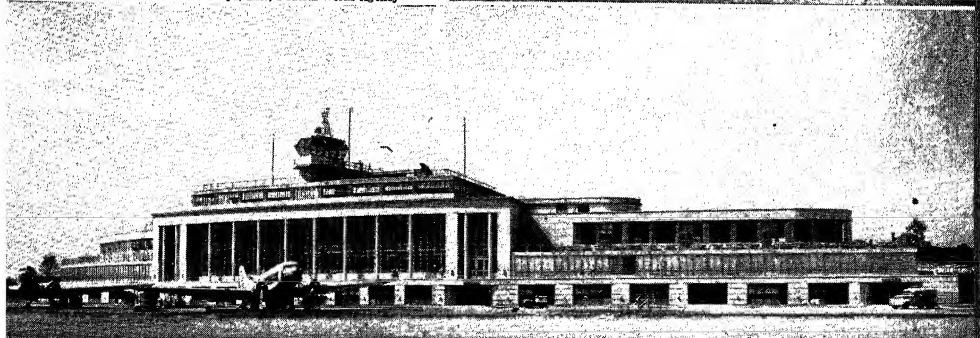
The Federal Reserve Building on Constitution Avenue, *above*, has simple lines of classic beauty. The Tomb of the Unknown Soldier, *right*, stands before the Amphitheater in Arlington Memorial Cemetery. The Interior Building, *below*, was erected in 1936.

Photos: Acme; Schostal



The Jefferson Memorial, *right*, was dedicated by President Roosevelt in 1947. Directly opposite, beyond the Washington Monument, is the White House. The Washington National Airport, *below*, across the Potomac River from the capital, was completed in 1947.

Photos: Fairchild Aerial Surveys, Inc.; Federal Works Agency



place to visit. Here are kept rare and valuable documents, such as treaties, ratifications of important bills, and the journals and letters of famous American statesmen. See ARCHIVES, NATIONAL.

National Academy of Sciences, on Constitution Avenue between Twenty-first and Twenty-second streets, N.W. The three-story white marble building contains seven exhibition halls which are so popular that bus loads of children come from as far away as New York City to study them. See NATIONAL ACADEMY OF SCIENCES.

National Bureau of Standards, Connecticut Avenue and Upton Street. Here are twenty-eight buildings on a tract of land covering nearly seventy acres. Government experts test, weigh, and measure such things as electricity, light, heat, time, flatness, sound waves, and air pressure. See NATIONAL BUREAU OF STANDARDS.

National Museum of the United States, along the Mall. See NATIONAL MUSEUM OF THE UNITED STATES.

Northwest Rectangle, in the northwest part of the Mall. Here are the buildings of the United States Public Health Service and the Federal Reserve Board.

Pentagon Building, on Columbia Island in the Potomac River, west of the Lincoln Memorial. This is the largest office building in the world and houses the Department of the Army. SEE PENTAGON BUILDING.

Smithsonian Institution, along the Mall. This is one of the largest and finest historical museums in any country. See SMITHSONIAN INSTITUTION.

Southwest Rectangle, southwest part of the Mall. Here are the buildings of the Social Security Board and the Railroad Retirement Board, and the General Federal Office Building.

Supreme Court Building. The outside of the building is of pure white marble in a formal and rich design. The roof is of dazzling white tile. Each of the heavy, sculptured bronze doors weighs six and a half tons.

United States Department of Agriculture, on the Mall between Twelfth and Fourteenth streets. Here specialists study methods of helping farmers produce good crops, raise livestock, prevent disease of animals and plants, and clear, drain, and irrigate the soil.

United States Department of Interior is in two buildings occupying the blocks bounded by D and F streets and Eighteenth and Nineteenth streets. There are ten museums, most of them featuring dioramas, or miniature scenes with tiny animal and human figures set in little landscapes and buildings made of wood, stone, or bark. Some of these dioramas illustrate the life and history of the North American Indian. Others show by means of pictures and maps the location of our national forests and the nation's deposits of coal, oil, water power, and other resources.

United States Bureau of Engraving and Printing, at Fourteenth and C streets, S.W. Paper money, bonds, notes, treasury warrants, and customs and postage stamps are designed, engraved, and printed in this noisy building. Enough of these are turned out every day to make a paper strip almost one thousand miles long.

Washington Monument, the tallest structure in the nation's capital. See WASHINGTON MONUMENT.

White House, home of the President. See WHITE HOUSE.

Other Interesting Places to Visit in and near Washington include the following:

Anacostia Naval Air Station, across Anacostia River from Washington. This air station, covering 313.4 acres, was commissioned on January 1, 1919. It serves as a "service station" to the Bureau of Aeronautics and other bureaus and offices of the Navy Department. It provides transport by air for officials from the Navy Department, various committees and commissions, members of Congress, and high-ranking government officials on important missions. In World War II, it served as a laboratory for testing new equipment including new type planes; it also tests electronic and radio devices.

Mount Vernon, home of George Washington. Fifteen miles south of the capital on the Virginia side of the Potomac. Easily reached by bus. See MOUNT VERNON.

Pan American Union, Seventeenth and B streets, N.W. This building is one of the most romantic places in Washington. It belongs to the twenty-one different countries in North and South America. Inside the entrance is a glassed court, or patio, where tropical plants, such as banana trees and coffee trees, are grown. There are also tropical birds.

Union Station, at Massachusetts and Delaware avenues. This great granite structure has room for the crowds which come to Washington for special events, such as the inauguration of a President. The decorations, statues, and the fountain in front of the station have been designed to make this a splendid gateway to the national capital.

United States Naval Hospital, Quantico, Va. This hospital on the Potomac, thirty-five miles south of Washington, was a haven for hundreds of Navy men and Marines during World War II. The hospital was commissioned in 1941 on a reservation covering about sixty acres.

Industry and Trade

The Metropolitan area of Washington manufactures products valued at nearly \$80,000,000 a year. This does not include the manufactures of the great government industries. These include the Government Printing Office, the largest plant of its kind in the world, and the United States Naval Gun Factory. There are about 400 manufacturing establishments in the city. About 350,000 persons are employed in the metropolitan area. About 130,000 of these persons are government workers.

Transportation. The trunk lines of seven railroads enter Washington at the Union Station. The city is well served by transcontinental bus lines and air routes. The Washington National Airport, at Gravelly Point, covers about 750 acres. Local transportation is provided by streetcars and motorbuses.

Government

Washington has no city government except that provided for it by the District of Columbia. The district is under the direct control of Congress. It is governed by three commissioners appointed by the President with the approval of the Senate. Two of the commissioners are chosen from civil life, and the third is an officer of the United States Army Corps of Engineers. Congress adopts all laws for the control of the District of Columbia. The commissioners appoint all city officials, such as the chief of police, fire chief, and similar officers. A small part of the expenses of district government is paid by the Federal Government, but the rest is paid by the taxes of Washington citizens.

Most of the citizens of Washington do not like their system of government, as it gives them no vote either in city affairs or in national elections. The Senate Judiciary Committee has reported favorably on an amendment to the Constitution which would permit the citizens of the capital to vote in national elections. The citizens have formed a number of municipal associations through which they can express their views on local government problems.

History

Washington began to grow soon after its site was chosen by President Washington. The north section of

the Capitol was completed in 1800, and Congress held its first session in the building in November of that year. In 1814, during the War of 1812, a British army captured the city and burned the Capitol, the White House, and other government buildings. These were rebuilt after the war. During the War between the States, Washington was threatened with capture by Confederate forces several times. In 1871 vast improvements to the capital were begun. As a result, Washington developed into a city worthy to be the capital of a great republic.

When the United States entered World War I in 1917, Washington became one of the great war capitals of the world. Many temporary buildings were erected for the additional workers needed by various government departments. After the war, Washington was the scene of several important international gatherings, including the limitation of arms conference of the major nations of the world in 1921.

During the depression of the early 1930's, Washington became the center of national attention as the nation's leaders sought a way out of the crisis. In 1932 a "bonus army" of unemployed war veterans marched on the capital, and were driven out by Washington police and soldiers under the command of General Douglas MacArthur.

The New Deal policies of President Franklin D. Roosevelt increased the importance of Washington as a center of the nation. Increased Federal control of national economic affairs brought persons from all parts of the United States to work for the government.

The city experienced still greater expansion during World War II. Many hotels, apartment houses, and mansions were converted to office space, and the capital became uncomfortably crowded. Rationing, price controls, and other regulations of the wartime emergency found Washington playing a direct part in the daily life of every citizen of the United States. After the war, peacetime reconversion and international relations were leading problems in Washington.

Related Subjects. The reader is also referred to:

COLLEGES AND UNIVERSITIES

American University	George Washington University
Catholic University of America	Howard University
Dunbarton College of Holy Cross	Trinity College
Georgetown University	Washington Missionary College
	Wilson Teachers College

IMPORTANT BUILDINGS

Archives, National	National Museum of the United States
Army Medical Museum	Naval Observatory, United States
Carnegie Institution	Reed, Walter, General Hospital
Folger Shakespeare Library	Saints Peter and Paul, Cathedral of
Library of Congress	Smithsonian Institution
National Academy of Sciences	White House
National Bureau of Standards	
National Gallery of Art	

UNCLASSIFIED

Brookings Institution	Flag (color plate, Flags of the States)
District of Columbia	

Food (Famous Foods of the States)	(color plate, Historic American Buildings [The National Capitol])
L'Enfant, Pierre C.	Washington, D.C.,
Lincoln Memorial	Navy Yard
Pan American Union	Washington Monument
United States of America	

Questions

When was Washington, D.C., chosen as the capital of the United States? Who laid the cornerstone of the Capitol?

What is the population of Washington, D.C.? About how many of its people are government workers?

What are the four main sections of the city? What streets divide these sections?

To whom does the Pan American Building belong?

WASHINGTON, Ga. (population 3,537), is the trading center of a cotton-growing region in northeastern Georgia, about fifty miles northwest of Augusta. The city was founded in 1780 and named for George Washington.

E.M.C.

WASHINGTON, Pa. (population 26,166), is the trading center and county seat of Washington County, in the southwestern corner of the state. It lies in the valley of Chartiers Creek. The chief industries are the manufacture of glass and tin plate.

Washington is the home of Washington and Jefferson College. The town was laid out by David Hoge in 1781. During the Whisky Rebellion (1794) it was a headquarters for leaders of the movement. Washington became a borough in 1810 and a city in 1924.

R.O.H.

WASHINGTON, AUGUSTINE, a brother of George Washington. See OHIO COMPANY.

WASHINGTON, BOOKER TALIAFERRO (1856-1915), was one of the greatest of American Negroes. He was an outstanding educator, reformer, and writer. Washington was born a slave on a plantation in Franklin County, Virginia. As a boy he worked in the saltworks and coal mines of West Virginia and went to school at night. In 1872, at the age of sixteen, he walked almost 500 miles from his home to Hampton Institute. (See HAMPTON INSTITUTE.) Washington worked his way through school and was graduated in 1875. Afterward he taught for a short time at Malden, W.Va., and later at Hampton Institute. Here he showed such ability that in 1881 he was chosen to organize a similar school for Negroes at Tuskegee, Ala.

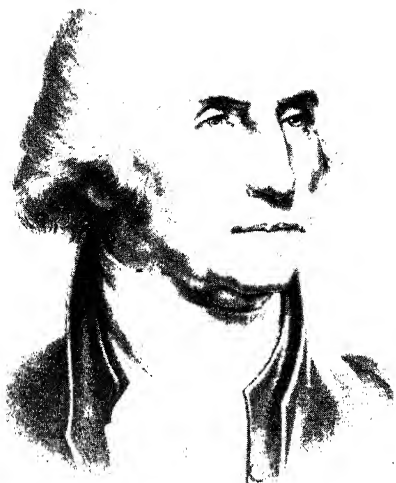
Washington opened his school in an old church with only thirty pupils, but in time the school grew into the famous Tuskegee Normal and Industrial Institute. (See also TUSKEGEE NORMAL INDUSTRIAL INSTITUTE.) This school contributed to educational theory and practice in the United States by successfully combining academic and industrial work. Washington was also an excellent public speaker and addressed audiences throughout the world on such subjects as the problems of the Negro.



Harris & Ewing

His Works include *Up From Slavery* and *The Future of The American Negro*.

Booker T. Washington was once a slave, but he became a leader of the Negro race.



George Washington

1st President of the United States, 1789-1797

WASHINGTON, GEORGE (1732-1799). The people of the United States, and many other lands call George Washington the "Father of His Country." Washington truly earned that title. He looked after his country the way a good father would look after his son. He fought for his country, and helped it grow large and strong. He guided his country when it was young, and helped to set up a wise and good government. In the history of the world, no man has done more to help any country than Washington did to help the United States.

From the time George Washington was a boy, he loved his country deeply. He loved its mountains and rivers and plains. He loved the customs and the ways of the people who lived in his country. Most of all, Washington loved the spirit of liberty and freedom which grew among his countrymen, and which they fought to uphold.

After George Washington reached manhood, he was a wealthy Virginia plantation owner. He enjoyed the life of a gentleman farmer. But time and again he left the life that he loved to serve his country through great hardship and toil. He gave freely of his time and energy to help establish his country among the independent nations of the world.

George Washington held three positions which were very important to all the people of his country. First, he served as the Commander in Chief of the first American Army. This army fought the Revolutionary War to win American independence from Great Britain. Washington worked long, weary days and nights to train school-boys, farmers, and businessmen as fighters. He used all his military knowledge to defeat British forces that were often much stronger and better trained than his own.

Through all the darkest days of the war, Washington was courageous and full of hope for victory. He kept up the spirits of his men during the long, bitter winter they spent at Valley Forge. There was not enough food and clothing, and the men had no shelter from the cold.

They wrapped their feet in rags when their boots wore out, and huddled together around tiny campfires in an effort to keep warm. Washington suffered with his men and for them. As Commander in Chief of the army, Washington did more than any other man toward winning the Revolutionary War in America.

The second nationally important position that Washington held was that of president of the Constitutional Convention. The Convention was a meeting of fifty-five of the wisest men in the country. They gathered in Philadelphia in 1787 to make the laws which would guide the colonists to form a nation. Washington led and advised these men who shaped the government and drew up the Constitution of the United States. As president of the Constitutional Convention, Washington played an important part in joining the separate states into a single united nation.

The newly formed states adopted the Constitution which the Convention had drawn up. Under the terms of this Constitution, the people of the country elected George Washington the first President of the United States. So the will of the people made Washington the first man to carry out the laws of the Constitution of the United States. This was the third great task Washington accomplished for his country. As President, Washington acted again and again to hold the young United States together, and to start the country on its path toward greatness.

Pictures and paintings of George Washington show that he was a fine-looking man. He was tall and big-boned, but the active life he led kept him slender and muscular. His face was stern and deeply lined. He had a dignified way of standing and walking, and he looked like a proud and haughty person. Washington's appearance sometimes made persons timid and shy before him, but his charm and pleasing ways quickly put people at their ease, and made them his friends. Humble farmers and rough backwoodsmen felt at home with Washington, just as the greatest statesmen and foreign noblemen did.

When he was a boy, Washington was shy and quiet,

and extremely modest. As he grew older, he lost some of his shyness and learned to talk easily with other persons. But the modesty of his youth lasted through the years of his greatness.

Time has changed our ideas about George Washington. Early books about the first President told of a man who was almost perfect in everything he did. According to these books, Washington was an example for all men to follow. But the writers made Washington seem a cold and somewhat unfeeling person, who was almost too perfect to be real.

Well-meaning writers made up stories about Washington's boyhood that were supposed to set an example for children. One of these stories told how young George was so truthful that he admitted cutting down his father's cherry tree. Another story told that he was so strong he once threw a silver dollar across the Rappahannock River. Writers stated firmly that "Washington never told a lie," although they had no way of really knowing whether or not the statement were true.

Later writers told a very different story of Washington. They based their story on careful studies they had made of the diaries Washington kept and of the letters he wrote, and of the writings of persons who actually knew him. This later story of Washington showed that he had faults, as all men have, and that he was by no means cold and unfeeling. Today we know that Washington was a man of strong feelings. He had a high temper which he always tried hard to control. But he was a warm and friendly person, and he loved other people deeply. Washington liked jokes, and laughed heartily at them. He was extremely fond of children. The modern picture of Washington is more human and lovable than the old one, but it is in no way less great.

The first President was a man of action, rather than of education or of deep political or philosophical ideas. Young George had little schooling, even for his day, and paid small attention to books. But he spent his lifetime learning. He learned from the people about him, and he learned from experience.

Washington was always ready to listen to the opinions of other men. As President, he chose two men for his Cabinet who were far better political thinkers than he was. These two men were Thomas Jefferson and Alexander Hamilton. The two did not agree on the best form of government. Jefferson argued that the common people should be given a large share in the government. Hamilton wanted the wealthy, highly educated people to run the country because he believed they were best fitted to do so.

President Washington asked both men for their advice, and listened to what they said. He did not fully agree with either man. But he was guided by their judgment and tried to benefit from their advice. At all times, Washington worked hard to be fair to everyone.

Washington himself had a deep respect for law and order. He liked the old, established, time-tested ways of doing things. His sense of fairness led him to believe that the American people had a right to revolt against Great Britain. He believed that every man had a right to his own liberty and property. He thought that the British laws before the war interfered with the right of free government belonging to all British subjects. So he en-

couraged and led the American revolt. But Washington could not understand the deep feelings and the violent spirit of revolt which led the French people into the French Revolution.

The President believed that his country's welfare depended upon property owners. He thought that people who had made an investment in the country would do more for the United States than poor men. Washington himself was a very wealthy man. He owned many hundreds of acres of rich farm land on his estate at Mount Vernon. He grew and sold great crops of cotton and tobacco, and made large profits from his sales. His friends were people of property and wealth. Washington liked and understood such men, and thought they should run the country.

Washington also liked the common people of his country, and was deeply interested in their welfare. He was generous, and honestly concerned about helping persons who had less wealth than he had. He tried to open western territories, so that people who did not own land could get free homesteads from the government. But he still thought that the large property owners should control the government. Jefferson's democratic ideas about a government controlled by the people were new and unproved, so far as Washington's views were concerned.

Washington's countrymen admired and respected him. Both rich men and poor men liked his dignity, his calm judgment, and his high sense of justice and honor. Lovers of freedom throughout the world looked upon Washington as a great leader in the cause of liberty. His good sense, fairness, and willingness to look at both sides of a question helped the United States through its stormy early years.

George Washington was a truly great leader of men. Americans followed where he led them, whether he led as a soldier or as a statesman. In every way, Washington lived up to what one of his friends once said about him. He was "First in war, first in peace, and first in the hearts of his countrymen."

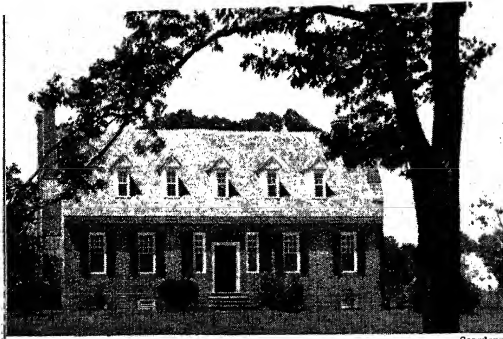
Early Years

Ancestry. The Washingtons were an old English family. Their family home was Sulgrave Manor, in Northamptonshire. Members of the family played a part in English history after the year 1180.

The American branch of the family was established in 1656. Two brothers, John and Lawrence Washington, bought lands in Westmoreland County, Virginia. John was elected to the House of Burgesses and became a colonel of militia. When he died in 1677, he left two sons. One of them, Lawrence, was the grandfather of George Washington.

Boyhood. George Washington was born on February 22, 1732, at a farm in Virginia called Wakefield. Washington's birthdate is figured by the new, or Gregorian calendar, which Great Britain adopted for itself and its colonies in 1752. (See CALENDAR.) George was the son of Augustine Washington and Mary Ball Washington.

The Washington family was large. Augustine Washington had been married once before. He and his first wife had a family of three sons and a daughter. George was the first child of Augustine's second marriage.



Wakefield, the Birthplace of George Washington, is now a national monument in Virginia. The mansion overlooks the Potomac River, marking the site of the original house which was destroyed by fire on Christmas Eve in 1780.

Three other sons and two daughters soon followed.

Not long after George Washington was born, his family moved to the Ferry Farm on the Rappahannock River, across from the village of Fredericksburg in what is now the state of Virginia. Here George spent his early boyhood.

Early Education. Young George had little schooling in classrooms. He learned to do simple arithmetic, and he learned something of farming methods. One of Washington's copy books, dated 1747, included his Rules of Civility, which he had copied as a school exercise. These were rules of etiquette and good manners which young George considered important. Some of the rules are listed in the table below. He also learned to ride horseback easily and well, to row and sail on the rivers, to hunt, and to swim.

George was eleven years old when his father died. He stayed on for a few years at "Ferry Farm," and then went to live with his half brother, Lawrence.

A New Home. Lawrence Washington was George's favorite relative. He was a man of influence and great social charm. He was also a hero of the Wars of the

WASHINGTON, GEORGE

Spanish Succession, and one of the founders of the Ohio Company. The Ohio Company was made up of British colonial subjects and London Merchants. These men had trading rights in land which the British King George II had granted them. Lawrence's estate, called Mount Vernon, was on the Potomac River not far from the little town of Alexandria in what is now the state of Virginia.

Lawrence had married the daughter of his nearest neighbor, William Fairfax, whose beautiful estate was called Belvoir (Beautiful View). William's two sons, Bryan and George, and his cousin, Thomas, Sixth Baron of Fairfax of Cameron, made Belvoir a lively place.

Lord Fairfax was a bitter, unsociable man, but he took a great fancy to young George Washington and liked to go fox hunting with him. The old nobleman enjoyed the shy silence of the tall, handsome boy, who could listen and observe and draw beautiful maps with his big hands. A few months after Lord Fairfax met George, he gave the boy his first job. George was allowed to go with the group of surveyors who were going out to survey Lord Fairfax's lands across the mountains. The group traveled through parts of the Shenandoah Valley, in what are now the states of Virginia and West Virginia.

The trip over the wild Blue Ridge Mountains was an important event in George Washington's life. He saw mighty rivers and rich valleys. He learned the ways of frontier life. He watched the pioneers clearing land for their settlements, and even attended a conference with the Indians.

Lord Fairfax paid young George good wages for his work, and let the boy invest some of his earnings in land. He also recommended George for another surveying job. So at the age of sixteen, young Washington was a landowner as well as a man with a paying job. He danced with the lovely Virginia girls at the great houses along the lazy rivers, and wondered if some of them might take him seriously as a possible husband. But Washington

WASHINGTON'S RULES OF CIVILITY

When George Washington was fifteen years old, he copied in an exercise book certain rules of behavior which he thought were important. The copy book is now on display in the Library of Congress, in Washington, D.C. Some of the rules

which Washington considered "decent behavior in company and conversation" are listed below. The spelling and capitalization of Washington's time are used.

In the Presence of Others Sing not to yourself with a humming Noise, nor Drum with your Fingers or Feet.

Sleep not when others Speak, Sit not when others stand, Speak not when you Should hold your Peace, walk not on when others Stop.

Turn not your Back to others especially in Speaking, Jog not the Table or Desk on which Another reads or writes, lean not upon any one.

Keep your Nails clean and Short, also your Hands and Teeth Clean yet without Shewing any great Concern for them.

When you meet with one of Greater Quality than yourself, Stop, and retire especially if it be at a Door or any Straight place to give way for him to Pass.

Use no Reproachfull Language against any one neither Curse nor Revile.

Wear not your Cloths, foul, unript or Dusty but see they be Brush'd once every day at least and take heed that you approach not to any uncleanness.

Play not the Peacock, looking every where about you, to See if you be well Deck'd, if your Shoes fit well if

your Stokings Sit neatly, and Cloths handsomely.

Gaze not on the marks or blemishes of Others and ask not how they came. What you may Speak in Secret to your Friend deliver not before others.

While you are talking, Point not with your Finger at him of Whom you Discourse nor Approach too near him to whom you talk especially to his face.

Treat with men at fit Times about Business & Whisper not in the Company of Others.

Be not Curious to Know the Affairs of Others neither approach those that Speak in Private.

It's unbecoming to Stoop much to ones Meat Keep your Fingers clean & when foul wipe them on a Corner of your Table Napkin.

In Company of your Betters be not longer in eating than they are lay not your Arm but only your hand upon the table.

If others talk at Table be attentive but talk not with Meat in your Mouth.

Labour to keep alive in your Breast that Little Spark of Celestial fire Called Conscience.

WASHINGTON, GEORGE

was too solemn and quiet to have much success with them.

Further Education. George's lack of schooling had left him a slow reader and a very poor speller. George's relatives were sorry about this, but they knew that such faults could not keep a good man down. He had two tutors, or private teachers. They were old friends who had served with Lawrence Washington in the West Indies campaign. These tutors taught young George the arts of war. Both at Mount Vernon and at Belvoir, George learned the courtesies and polished manners expected of a Virginia gentleman.

Master of Mount Vernon. Lawrence Washington had always been in delicate health. In the autumn of 1751, he grew so ill that he set out on a voyage to Barbados Island in the West Indies in a final effort to cure himself. George went along for the one and only foreign trip he ever made. George had smallpox while he was on the journey. It was a light case, but his face was somewhat scarred for the rest of his life.

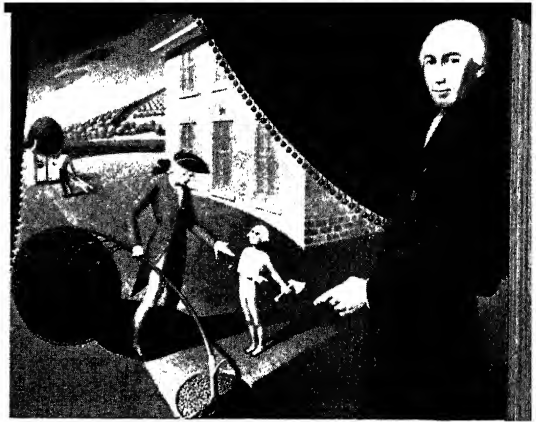
Lawrence soon saw that he was not going to get well, and returned to Mount Vernon to die. He left George in charge of his estate. Lawrence's baby daughter died the year after her father died. Lawrence's widow soon married again, and thus gave up her claim to the estate. George inherited the estate and became owner of Mount Vernon.

Life on the Frontier. In 1753 Governor Robert Dinwiddie of Virginia chose George Washington for an important mission. Washington was then twenty-one. The Governor was a member of the Ohio Company, which had once been headed by Lawrence Washington. Scouts and fur traders of the Ohio Company were having trouble with the French, who claimed much of the land which the company claimed. Both sides in this fierce struggle for trade kept asking their governments to settle the question of boundaries and trading rights. But action was slow, and the Ohio Company was losing both men and valuable furs.

Dinwiddie wanted to send a warning message to the captain in charge of the French trading posts. The governor reasoned that the messenger might observe the French posts closely and perhaps get a good idea of what the French were up to and how they were situated. Young George Washington was just finishing his first year as a major of the Virginia militia, and seemed the right man for the job.

Washington took a small party of men and made the dangerous five-hundred-mile journey into the wilderness, where he lived under conditions much like those he had known when he went to survey land for Lord Fairfax. He delivered the governor's letter, and brought back the French officer's polite refusal to move from the trading posts. Washington also brought back a report on French activities which the governor published at once and sent to Great Britain. The report brought some fame to Major Washington, and convinced the governor that he must use force to drive out the French. The Virginia Assembly voted to supply troops and money. Washington was made a lieutenant colonel and given a command in the expedition.

In 1754 Colonel Washington again set out toward the Ohio River. This time he led a small, poorly equipped



Grant Wood, Associated American Artists

George Washington Cutting down the Cherry Tree is a legend made popular by Parson Weems. This painting by Grant Wood shows Weems pointing to the episode of George's confession to his father. Parson Weems, a bookseller, wrote a biography of Washington that was historically inaccurate.

band of troops from the Virginia militia. He soon got word that French forces had captured the half-finished fort which other members of the Virginia militia were building on the Ohio Forks. The French then completed the fort themselves. They named it Fort Duquesne, and fortified it with guns and guards. From this base, the French quickly drove the whole Virginia expedition out of the region. In May, 1754, Washington's forces had been successful in an attack made on the French near Great Meadows. But in July, at the battle of Great Meadows, Washington had to surrender Fort Necessity, which he had built on Great Meadows.

Washington knew nothing of the French language, so he was unable to read the terms of surrender. He signed them without knowing that they were unreasonably harsh. Washington was harshly criticized and was left with a bitter sense of failure. He returned to Mount Vernon and began enlisting and training new companies of militia.

French and Indian War. Great Britain set out to drive the French troops and traders from the disputed lands, although war between Britain and France was not actually declared. The British Government planned to send strong home forces to the colonies, and to train colonial regiments for the campaign.

George Washington was considered an experienced colonial officer, and was urged to serve in the British forces. But the British announced that colonial officers would not be allowed to hold any rank above that of captain. Washington refused to accept a lower rank than he held, and resigned from the militia. But he still wanted to be part of the undertaking. Finally, when General Edward Braddock arrived from Great Britain in February, 1755, he made young Washington one of his aides and invited him into the official family.

It took all spring and part of the summer to move the British and colonial army with its guns and baggage through the wild country and over the mountains. By July 9, the British troops were at last approaching Fort Duquesne. Suddenly the French and their Indian allies made a surprise attack from the forest. The British colonial regiments were cut up and driven back. General Braddock was fatally wounded. W



George Washington Surveying the Wilderness of the Blue Ridge Mountains. Washington was an expert surveyor when he was only sixteen. He did such an excellent job in the Blue Ridge area that he was appointed a public surveyor.

maintained cool in the midst of murderous fire which twice shot down a horse he was riding. He dashed here and there to carry messages. He helped get the dying General back out of the line of fire, and played an important part in organizing an orderly retreat.

Washington won fame and glory in the battle. But fatigue and exposure had injured his health and for weeks he lay ill at Mount Vernon.

When Washington recovered, he was raised to the rank of colonel and called back into action. For three years he served in the wilderness. There he met every kind of difficulty and discouragement. But he stuck grimly to a dreary command which offered him neither victory nor glory. At last the French were defeated in Canada and withdrew from Fort Duquesne. It became clear that the British were sure to win. (See FRENCH AND INDIAN WARS.) Washington then felt that he could resign his military duties and take up the life of a civilian once more. France and Great Britain did not actually make peace until 1763. But the war was over in 1758 for the citizens of Virginia and the members of the militia.

Marriage. During his service in the war, George Washington had been elected to the Virginia House of Burgesses. On his last furlough before leaving the army, he had become engaged to Martha Dandridge Custis, a wealthy widow with two small children.

In January, 1759, about a month after Washington gave up his command, he married Martha at the Custis estate. The House of Burgesses was meeting that winter, so the bride and groom lived first at the Custis house in Williamsburg, the capital of colonial Virginia. Williamsburg was a charming town, with wide streets, fine houses set in lovely gardens, a handsome church, and gay taverns. The huge residence of the royal governor, called the Palace, and the fine brick structure where the Burgesses met, marked the town as the center of government. Washington's months in Williamsburg were happy ones, but he longed for his broad estates and the life he knew best.

Washington the Farmer. In early summer, 1759,

WASHINGTON, GEORGE

George Washington moved his family to Mount Vernon. Now, at last, the twenty-seven-year-old hero of the French and Indian War could settle down to farming, which was the work he loved. His wife's property added about 5,000 acres to Washington's already large holdings. It was a big job to manage this great estate, which was made up of widely scattered lands. Washington worked hard at the task, but he gave his closest attention to Mount Vernon.

Washington was a good farmer. Many of his ideas about farming were far ahead of his time. He planted different crops and changed them from year to year, in a period when most Virginia landholders raised only tobacco. He used manure and compost to enrich the soil, and worked steadily to stop erosion, or the washing away of unprotected ground. He studied all the information he could find, tried to develop better breeds of sheep and cattle, experimented with cross-fertilization of fruit trees, and developed a thriving kitchen garden, filled with many kinds of vegetables and herbs.

All of his dealings were carefully set down in a ledger, or account book. The master of Mount Vernon was a skillful bargainer and careful manager. He had an almost limitless amount of energy. Dawn would find him riding over the estate to examine everything he could see. A broken fence, a lame horse, or a washout in a field brought his anger down on the overseer. The careless methods of other planters made him indignant.

Washington was a big shipper of tobacco and an importer of goods from Great Britain. From this trade, he got an all-round experience with the economy of his day. He started workshops on his estate, where indentured servants (those under contract to work) and carefully selected slaves could produce many of the materials he needed.

Public and Political Career

Trouble with Great Britain. The French and Indian Wars had been expensive for Great Britain. Many of the

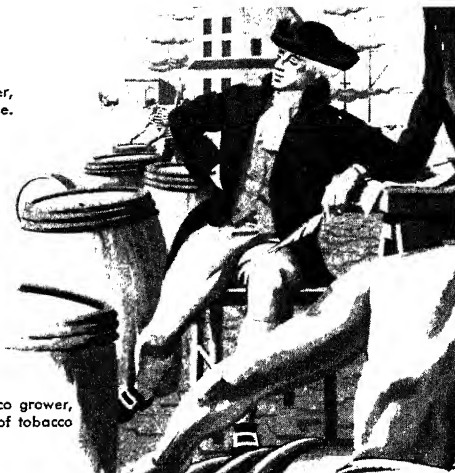
Lieutenant-Colonel Washington's First Military Mission was to protect British boundaries in the Ohio area. His small force of militiamen won a skirmish with the French, but the outnumbered Virginians were finally forced to leave Ohio.

Chicago Historical Society





George Washington, the farmer, examining the hoof of a lame horse. He was an expert horseman.



Washington, the tobacco grower, checking off hogsheads of tobacco being loaded on a ship.

British felt that the American colonists ought to pay the costs of their own protection. In the 1760's the British Government began a much firmer policy toward the colonies. See **REVOLUTIONARY WAR IN AMERICA** (Causes of the War).

For many years, Americans had paid little attention to British taxes, and the British officials had not tried very hard to collect them. Smuggling was common. The new British policy put an end to all this. Customs officers began collecting the taxes. They even went so far as to enter and search the homes of Boston citizens.

As a big shipper of tobacco and an importer of goods from Great Britain, George Washington did not like the new policies. He did not enjoy any more than anyone else having British fingers stuck in his pocketbook. But with his customary fairness, he thought they probably had a right to be there.

Slowly George Washington was won over to the idea of resistance. By 1769 he was writing to his distinguished neighbor, George Mason, that "no man should scruple or hesitate a moment to use arms" in protecting his liberty. But the idea of separating from Great Britain had not yet entered his mind.

Liberal leaders such as Patrick Henry, Richard Henry Lee, and the brilliant young Thomas Jefferson spoke out vigorously against the royal governors who dissolved their Virginia House of Burgesses and tried to enforce the hated British laws. Washington joined the liberals in sending protests to the King, and in such acts as the agreement to import no more British goods. He warmly approved Jefferson's plan to organize Committees of Correspondence to keep the colonies in touch with one another. But he had no grudge against the royal governors. Other men might rage when a governor dismissed the Assembly, but Washington would dance gaily at the next Palace ball. In the same week, he might attend one of the secret meetings of the Virginia Assembly, which had been forbidden by British law.

The arguments of such men as Thomas Paine and John Dickinson made a great impression on Washington. He came to believe that Great Britain was being untrue to the great British principles of free representative government. He was ready to fight, if necessary, to protect the liberties to which he thought British subjects were everywhere entitled.

First Continental Congress. After the famous Boston Tea Party, the British placed Boston under military control. Many persons in Virginia were very angry. But George Washington, the calm conservative, was the one who spoke the words that startled the country. At an illegal meeting of the Assembly in Williamsburg, in August, 1774, he declared quietly, "I will gladly enlist at my own expense one thousand men and march to the relief of Boston."

The younger and more radical men of the Assembly were surprised and delighted. When word came that a convention of all the colonies had been called at Philadelphia, George Washington was quickly chosen as one of the representatives from Virginia.

The First Continental Congress gathered in September, 1774, at Carpenter's Hall, near the Philadelphia State House. Washington made no speeches. Instead, he moved about among the delegates to get acquainted with them. Many a patriot in homespun garments was delighted to find this elegant planter so well informed and so firmly resolved to go as far as necessary in upholding the cause of freedom. Washington came away from the Congress still hoping and believing that the British Government would listen to the petitions of the colonists and reform its policies. Yet it seemed quite natural to him that he should return to Virginia and begin drilling the county militia. He hoped and believed that war would not come, but he also realized that he might be mistaken.

During the next six months, the British Government made it plain that the taxation program would be enforced in America at all costs. In defiance of the British governor of Virginia, Lord Dunmore, the Virginia House of Burgesses met at Richmond in the spring of 1775. St. John's Church served as the assembly room. There, Patrick Henry arose from one of the pews and uttered the sentence which was to run like flame from one town to another throughout the country: "Give me liberty or give me death!" Washington walked out into the peaceful churchyard that afternoon feeling that war was very near. Soon he began to train one group of militia after another.

Patrick Henry had also said, "the time for action is at hand." By mid-April action had begun. In Massachusetts the British General Thomas Gage tried to seize the

militia's store of ammunition, and the aroused American farmers resisted in the Battle of Lexington. Two days later, Lord Dunmore sent armed sailors from a British gunboat to seize the stored ammunition of the Virginia militia. He kept an armed guard around the Palace as protection against the enraged colonists.

Washington Named Commander in Chief. The Second Continental Congress opened in May at the Philadelphia State House. Washington's appearance made a sensation. He was dressed in the blue and buff uniform of a colonel of the militia. Everyone knew at a glance that he was ready for war with Britain. John Adams lost no time in recommending that Washington be named Commander in Chief of the American army. In spite of the ambitions of other men and the general distrust of a man of large property, the Congress elected him to the office on June 15. Washington was overcome by the great responsibility and by his natural shyness. He thanked the delegates in a low voice, saying:

I beg it may be remembered by every gentleman in the room that I this day declare with the utmost sincerity I do not think myself equal to the command I am honored with.

That very day word came that warships and troops had reached Boston, and that the city was under martial law. On June 23, Washington, with a mounted escort, set off for Boston by way of New York City. On the road, a galloping messenger halted to report the news he was carrying to the Continental Congress. He told of the Battle of Bunker Hill. Eagerly General Washington listened to the stirring account and exclaimed, "This country's liberties are safe!"

In New York City, and all along the Post Road to Boston, the Commander in Chief was received like a conquering hero. Finally he reached Cambridge, Mass., where he met a large body of colonial troops. There Washington reviewed the troops under a giant elm which afterwards stood as a memorial for nearly a hundred and fifty years.

Making an Army. Washington was horrified by the lack of uniforms, arms, and discipline among the volunteer farmer youths. He at once set about reorganizing the regiments. Until the end of the war, Washington was forever struggling to get clothes, food, and pay for his soldiers. The army had to depend upon volunteers because there was no way to draft soldiers. Every spring the army faded away as the farmer-soldiers hurried home to plant their fields. Few of the officers had experience or training. Patiently General Washington worked to develop a staff and to enforce high standards of conduct and obedience among the untrained colonial troops.

Washington's army entrenched itself on the hills around Boston. An expedition under Aaron Burr and Benedict Arnold was sent north to take Quebec and Montreal. This attempt failed, but it was a brilliant plan.

Freedom for Boston. During the summer and fall of 1775, the American and British armies faced each other without action. The year 1776 began, and still no battle was fought. Toward the end of the winter, Washington began to fortify the heights directly overlooking Boston. This was done so secretly that the British were taken by

surprise when Washington's cannons began firing into the town. In a short time the enemy withdrew, and Boston was free at last. The grateful citizens of the town honored Washington, and the people of all the colonies were overjoyed.

Then the American Army moved on to defend New York City from invasion. While Washington was encamped there, the mighty news of the Declaration of Independence arrived. From then on the purpose of the war was to free America from Great Britain.

America at War

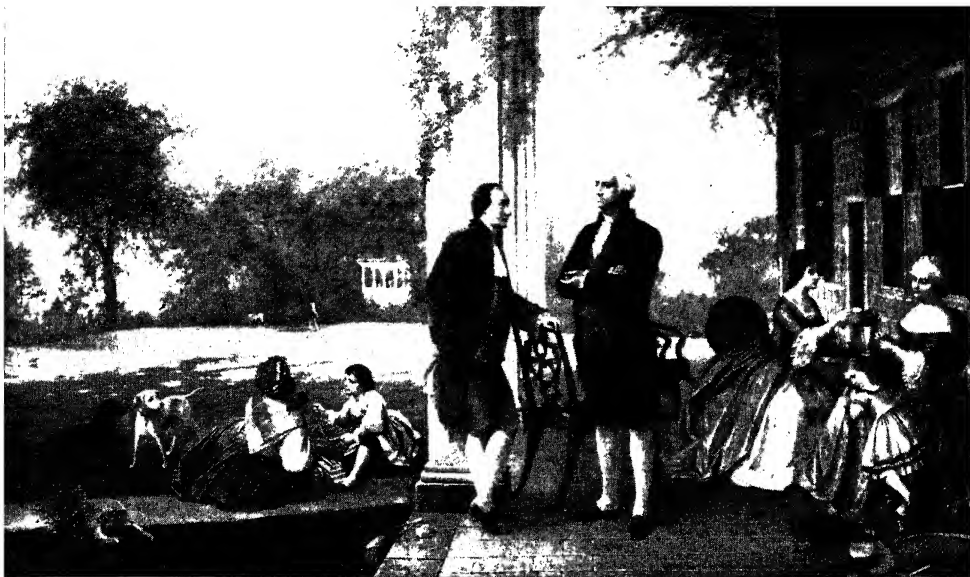
The Fight for Independence. The Americans did not have another success until the end of the year 1776. All efforts to keep the British from invading New York City failed. Only by skillful retreats could Washington keep his regiments from being wiped out by the British army. During the fall of 1776, Washington retreated across New Jersey, keeping the British General Charles Cornwallis busy and yet managing to escape a real battle. In late December came the famous surprise attack on Trenton. Washington crossed the Delaware River and attacked the Hessian troops very early in the morning. Washington and his troops either killed or captured all but a few men. A few days later Washington's troops crushed the rear guard of Cornwallis' army near Princeton.

Washington gained three important results by these victories. First, he encouraged patriots in the army and behind the lines. Second he convinced the ministers of the French King, Louis XVI, that the new nation was worth helping because it had a chance to win the war against Great Britain. Benjamin Franklin, at the French Court, made the most of the success at Trenton. Finally, Washington inspired enough respect among the British commanders to make them more cautious. Thus he gained the time that he needed to train his troops and place them to the best advantage.

The spring of 1777 brought to America the French Marquis de Lafayette, who had risked life and fortune to join his hero, George Washington. The first meeting of Lafayette and Washington began a lifelong friendship between them. Lafayette was attached to the General's personal staff. The French patriot was wounded in the fight at Brandywine Creek, but recovered in time to rejoice in the glorious news from the North. The British General John Burgoyne had been completely defeated. Burgoyne's large army had threatened to cut the colonies in two along the region of the Hudson River. His defeat was a turning point in the war.

Valley Forge. But the success in the north did nothing to help Washington's army. He moved his troops into Valley Forge in order to keep watch over the British who had comfortably settled in Philadelphia. The American troops spent the winter of 1777-1778 at Valley Forge. That winter has gone down in history as the darkest chapter in the war for independence. The soldiers were ragged and freezing. Some were starving, and many were sick. The General could get no supplies. See VALLEY FORGE.

The year of 1778 began with a disgraceful effort by jealous commanders in other parts of the country to destroy Washington's authority and have him removed



Metropolitan Museum of Art

Washington and Lafayette talking on the veranda of Washington's Mount Vernon estate. Lafayette was a firm friend

of the American cause, and his ability as a soldier aided Washington in training the colonials into an effective army.

from his command. But the winter's gloom was somewhat lightened by the devotion of the young officers at Valley Forge. Martha Washington brought a bit of gaiety and comfort when she arrived in a coach crowded with hampers of food for the staff.

One reason for the army's desperate condition was the weakness of Congress. It had no power over the states. Comfortable people far from the scene of war did not want to tax themselves for the general welfare. Tories, who were against the revolution, were scattered everywhere. Year after year Washington held his forces together by sheer force of will. Once he borrowed \$5,000 from Robert Morris, the financier, to pay the soldiers. Several times the great patriot, Haym Solomon, saved the day by advancing large sums of money. Month after month for eight long years, Washington had to struggle against Congress and the state assemblies to get even a little support for his army which battled for American independence.

France Joins the War. The spring of 1778 brought new hope. The new quartermaster general of the army, Nathanael Greene, was improving the quality and increasing the quantity of supplies furnished to the army. The former Prussian army officer, Baron Friedrich von Steuben was serving as a competent drill master. On May Day the whole shape of the war was changed when it was announced that France had made an alliance with the United States. French money and warships were already on the way. Lafayette was wild with joy over the news that his country had joined the war.

But 1778 brought more disappointments. The battle of Monmouth Court House proved Charles Lee a traitor, and ended in no definite victory. The French fleet arrived, but it could not get out of the harbor at Newport, and never managed to attack the British warships. Weary, disgusted, and sick, Lafayette returned to

France for a year. The only American success was in the West, where George Lewis Clark captured a fort on the Mississippi.

Victory at Last. The scene of battle shifted to the South. In 1780 Washington sent Lafayette south to help worry the regiments of Lord Cornwallis. Lafayette did much to push the British forces into Yorktown, where they could be surrounded by American forces on land and sea. The British surrender at Yorktown on October 19, 1781, was a mighty triumph for the Continental Army. After that, complete defeat of the enemy was only a matter of time.

The Commander in Chief Retires. The Commander in Chief did not leave his post until Nathanael Greene had finally freed the South from the British, and Sir Guy Carlton's last transports had at last pulled away from the New York City harbor. On December 4, 1783, Washington took final leave of his officers at Fraunce's Tavern in New York City. In the upstairs room where the loyal comrades parted, the Revolutionary flags and relics may still be seen.

Washington went on to Annapolis, where Congress was meeting, to offer his formal resignation as Commander in Chief. His reports were complete. His accounts of all the money he had spent during the war included hundreds of items, and amounted to \$160,074.

After Congress had honored the victor in a moving ceremony, George Washington was once more a private citizen. Joyfully he returned to Mount Vernon, and began to put things in shape after his long absence. Mount Vernon was ringing with children's voices as it had twenty-five years before. Washington's stepson, Jack Custis, died after the battle of Yorktown, and left a boy and a girl. His wife remarried, and Washington legally adopted the children, who were named Eleanor and George Washington Custis.

The Postwar Crisis

Unrest in the New Country. The American colonies were now "free and independent states," but they could scarcely be called a nation. The central government had no executive head, and almost no power. Each state set up tariffs which cut off trade and made the cost of living extremely high. The paper money issued by Congress was almost worthless.

In Massachusetts the assembly passed a new tax law which made the lot of the poor even harder. Daniel Shays led an armed revolt against the state authorities. It was promptly put down, but it frightened all the conservatives in America, including George Washington. Washington feared the growth of democratic ideas among unemployed soldiers, western pioneers, and workers who hired out in the towns.

A stream of letters poured from Mount Vernon. They pleaded for a firm central government. Writing of Shays' Rebellion to the man who later became his Secretary of War, Washington said:

I feel, my dear General Knox, infinitely more than I can express to you, for the disorders which have arisen in these states . . . There are combustibles in every State which a spark might set fire to.

Washington made his appeal to men of property and leaders in every state, as well as to all persons who wished to develop the Western lands and the vast resources of the country. He declared that the country needed a stable government and a well-founded system in money matters.

In 1786 a few efforts were made at interstate co-operation. The efforts led to a growing demand for changes in the government. At last the country's lawmakers decided to call a convention of all the states. The convention met on May 25, 1787, in the State House at Philadelphia.

The Constitutional Convention. George Washington was chosen as the delegate from Virginia, and was quickly elected president of the convention. From the start he knew, through private conferences with James Madison, that this meeting was going to do something far more important than merely give added strength to the old Congress. Washington knew that an entirely new framework of government was going to be proposed. Madison had come to the convention with a complete plan for a new government. Charles Pinckney of South Carolina had likewise brought along a plan. The delegates had been instructed only to suggest improvements in the present system, and any proposed new plan of government was completely irregular. But Edmund Randolph of Virginia spoke out in these words:

When the salvation of the Republic is at stake, it would be treason to our trust not to propose what we find necessary.

All summer the mighty debate went on. As presiding officer, Washington had little chance to speak. But everyone knew that he stood with the conservatives who wanted a strong central government, controlled by men of education and wealth, and concerned chiefly with the protection of property. On the other hand, he scorned Alexander Hamilton's wish to establish a monarchy and a titled aristocracy.

Often, as the fifty-five delegates argued, it seemed

that the gathering would break apart through its disagreements. At such moments, the convention delegates would glance at the elegantly dressed, patient, dignified figure sitting in the president's chair. Then they would remember the miracle of America's victory over a great power, and go to work again. As he had in the war, George Washington served in time of peace to hold his countrymen together.

On September 17, the new Constitution was finally drafted and approved. That evening Washington wrote in his journal:

The business being thus closed, the members adjourned to the City Tavern, dined together, and took cordial leave of each other. After which I returned to my lodgings . . . and retired to meditate on the momentous work.

Few members of the Constitutional Convention were satisfied with their work. When the Constitution went to the state assemblies for ratification, the land rang with objections. People greatly feared the transfer of power from the states to a Federal body. Limitations on voting angered the people. Men of small holdings joined the villagers in shouting that aristocrats alone had been represented at the Convention, and that they had framed a government in their own favor.

The Constitution Ratified. The strongest influence in favor of the Constitution was the general wish to get normal life moving again. People were tired of confusion and debate. They wanted to build, expand, manufacture, and trade. Slowly public opinion moved toward adoption of the Constitution. As opinion moved, eyes were again turned toward George Washington. He alone was trusted both by the conservatives and by the democratic leaders. All sides agreed that under Washington the new government might work, and this fact probably helped to get the Constitution ratified.

Election as President. In April, 1789, a messenger dashed through the Mount Vernon gates and announced to the assembled family that Washington had been elected the first President of the United States. John Adams had been elected Vice-President.

Washington could not refuse. With a heavy heart, the patriot turned his back once more on the private life for which he longed. He was weary of public service, and honestly felt unequal to the task before him. Even the wonderful demonstrations all along the way as his coach rolled and rattled up to New York City, the first seat of government, did not change his mind.

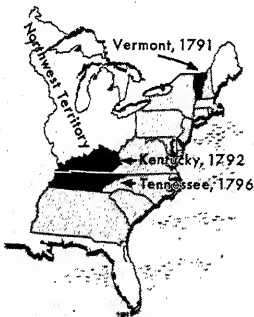
Administrations as President (1789-1797)

Washington took a house on Cherry Street and established himself as well as possible until Martha could come up with the children to take charge. On the day of his inauguration, self-doubts rushed over him like a flood. By the time he reached the balcony of the Federal Building at the head of Broad Street, where he was to take the oath of office, he was actually ill and sank into the nearest chair. But when the time came, he arose and in a ringing voice repeated the oath of office with his hand resting on a large Bible. Crowds of people in Wall Street and Broad Street cheered Washington enthusiastically and followed the official procession to St. Paul's Church on Broadway, where services were

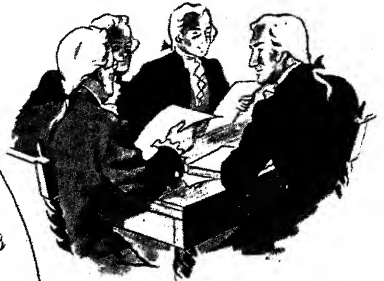
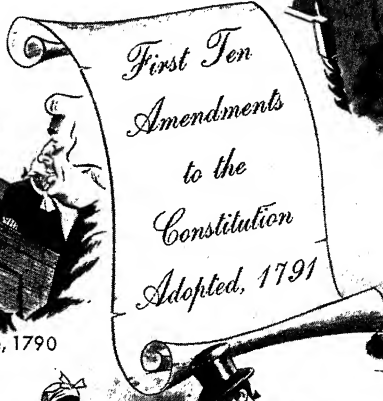
WHILE WASHINGTON
WAS PRESIDENT



Supreme Court Met for First Time, 1790



Three States Join the Union



First Cabinet Established, 1789



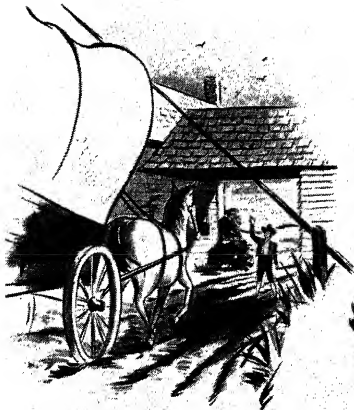
National Mint Established, 1792



Cotton Gin Invented, 1793



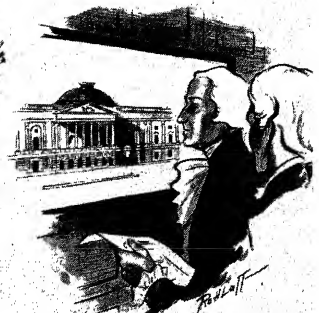
First Census Taken, 1790



First Toll Road Completed, 1794



Whisky Rebellion, 1794
First Challenge of Federal Authority



Plan for National Capital
Approved, 1791



George Washington at Valley Forge being comforted by his wife Martha. Washington, discouraged but not defeated, was bitterly angry at the bungling of supplies which caused such great suffering during the cold winter of 1777-1778.

held. In the evening, a parade passed up and down in the streets before the brightly lighted houses of New York City.

By autumn, Washington's Cabinet was complete, and John Jay had been appointed Chief Justice of the Supreme Court. Thomas Jefferson was chosen for Secretary of State, but it was some time before he returned from France, where he had been serving as American Minister. Alexander Hamilton became the first Secretary of the Treasury, Henry Knox was the Secretary of War, and Edmund Jennings Randolph was the first Attorney General.

Financial Policies. The first problem of the new government was to get money enough to pay its expenses. This was done by laying taxes on goods shipped in from foreign countries, and on some goods produced at home. The taxes on foreign goods helped United States industries get started.

The second problem was to pay the country's debt. The United States owed about \$12,000,000 to foreign countries and about \$42,000,000 to its own people. Washington knew that if this debt were paid in full, speculators would make fortunes, and that no one else would gain much. But he also felt that all debts ought to be paid. Some members of Congress had bought up government notes for much less than their face value, and they saw an opportunity to get rich by voting to pay the debt. With the President's full support, Hamilton finally got Congress to approve payment in full.

The third problem was the state debts. The different states had borrowed to carry on the war. Some states had already paid their debts, but \$25,000,000 remained

WASHINGTON, GEORGE

unpaid. At Hamilton's urging, the Congress voted to pay these debts as well.

Congress also voted to establish a Bank of the United States. Washington was pleased with these measures, but they convinced many persons throughout the country that the members of a wealthy and powerful class were in full control of the government.

French Revolution. Even before Jefferson got back from France, news of the French Revolution was trickling into the United States. Liberal Americans were stirred by the French principles of *liberté, égalité, fraternité* (liberty, equality, fraternity). But when events in France took a violent turn, Washington drew back in horror. See FRENCH REVOLUTION.

News arrived that the French King and Queen had been imprisoned. Later came the announcement that Lafayette had been captured by the Germans. France was surrounded by enemies. Great Britain was one of those enemies. Enthusiastic friends of France in the United States were toasting France, America's ally, and singing the "Marseillaise," the hymn of the Revolutionists.

Jefferson did his best to explain to Washington the meaning of the mighty struggle. But the President's respect for law and order and his fear of mob rule made it impossible for him to understand the full significance of the revolution in France.

The United States Starts Growing. Washington was full of hope and satisfaction about his own land. Tours of New England and of the South convinced him that prosperity was growing under the new government. Manufacture was beginning, and trade and shipbuilding were increasing. In order to open up Western development, the President sent a representative to Spain to discuss the free use of the Mississippi River, which Spain controlled. He also began to urge Great Britain to get out of the Western forts. The states of Kentucky and Vermont were both admitted to the Union during Washington's first term.

Re-election. In spite of his wish to retire from office, Washington was compelled to stand for a second term. By this time the Federal Government was set up in Philadelphia, and plans were under way to build a national capital on the Potomac River. Washington was elected by a huge majority, with John Adams again chosen Vice-President.

Neutrality Proclamation. Sympathy for France had now reached great heights in the United States. The ideal of a government devoted to the good of all the people rather than to the protection of property captured the minds and hearts of many Americans. Over-enthusiastic friends of revolutionary France began to demand war against Great Britain. Emotion was aroused by the arrival of an ardent French minister, Edmond Charles Édouard Genêt, better known as Citizen Genêt. Washington was certain that an unarmed nation just beginning to get itself organized did not dare dream of war. He issued a proclamation of strict neutrality and set about enforcing it. This action made Washington unpopular, and Great Britain did nothing to make matters easier. The British still held the Western forts, and were stopping American vessels for search. Goods intended for France were seized.



Mellon Collection, National Gallery of Art

The Washington Family, a painting by Edward Savage, is an excellent likeness of the group. Martha rests her fan on a map. At her side is her granddaughter, Eleanor Parke Custis.

But Washington turned a deaf ear to the fury of his countrymen, and sent John Jay to Great Britain to plead for better treatment. The people did not like Jay's Treaty, but President Washington signed it. After Citizen Genêt was replaced, the war clouds blew away.

Cotton Gin Invented. One of the most important events of Washington's second term was the invention of the cotton gin by Eli Whitney. This invention changed the whole economy of the South.

Whisky Rebellion. Less important, but far more startling at the time, was an uprising in western Pennsylvania against the tax on liquor. This so-called Whisky Rebellion was swiftly put down, and the country approved on the grounds that a small group could not be allowed to defy the government. But many persons hated the idea of sending Federal troops against backwoodsmen. A desire was growing for a second political party which would represent the people.

The first President seemed to represent aristocracy completely. He insisted upon great formality of procedure. Congress paid him \$25,000 a year and he spent his salary freely. When he set out to attend Congress, Washington rode in a magnificent coach with liveried servants and outriders. His entertainments were in the grand manner. His intention was to win the infant republic the respect of aristocrats everywhere.

A Difficult Decision. In 1795 Lafayette's son, who was named after George Washington, landed in the United States with his tutor. The President longed to take

General Washington has his arm on the shoulder of his step-grandson, George Washington Parke Custis. Washington's marriage was childless, but he adopted his two step-grandchildren.

the refugee to his heart. But he felt that if he, as a public official, followed such action, he would violate his own neutrality policy. So he arranged for the boy's living and education, and told George Lafayette to wait until his father's friend was no longer head of the nation.

Farewell Address and Retirement. At last came the time when the weary leader could lay down the cares of state. In September, 1796, he published his famous Farewell Address in the *American Daily Advertiser* of Philadelphia. It was a lofty appeal for peace and justice. It was in this address that he said:

The great rule of conduct for us, in regard to foreign nations, is, in extending our commercial relations, to have with them as little political connection as possible . . .

It is our true policy to steer clear of permanent alliances with any portion of the foreign world . . .

In the same address, Washington warned that the growth of political parties held dangers for representative government.

On March 4, 1797, he went to the Philadelphia State House to hand over his office. The admiration which United States citizens felt for the great leader poured itself out in speeches, editorials, and ceremonies. Washington was deeply moved. But John Adams, who took his place as President of the United States, sensed the relief in Washington's heart. Adams wrote to his wife:

He seemed to me to enjoy a triumph over me. Methought I heard him say, "Aye! I am fairly out and you are fairly in! See which one of us will be the happiest!"

One of Washington's reasons for that happiness entered the coach with him for the return trip to Mount Vernon. That reason was George Lafayette, who could now be gathered into the family. With Nellie and George Custis, the young Frenchman helped to make Mount Vernon a place of youth and gaiety for the returned master. Young Lafayette stayed with his father's friend until the glorious news came that his father, the Marquis, had at last been released from prison.

Later Years

Washington enjoyed two active, sociable years after his release from public life. He was a farmer once more, and devoted much time to improving his house and grounds. He was proud of the arcade, or covered walk, he put up to connect the house with the workshops and greenhouses.

Gifts and letters were showered upon him from every part of the world. He had to hire two young men to help him keep up with his correspondence. Visitors from every state in the Union and from various parts of Europe gathered at Mount Vernon.

Recall to Duty. Only one cloud darkened the horizon. That was a new threat of war—this time with France. The French Government was interfering with United States shipping on the seas, defying treaties, and refusing to receive the United States Minister. Matters came to a head when Prince Talleyrand, the French Minister of Foreign Affairs, bluntly demanded of the American Commission in Paris a large sum of money as the price of giving Yankee ships the freedom of the seas. When this proposal was reported in America, a shout of indignation went up. The watchword of the day became "Millions for defense, but not one cent for tribute."

Many high-spirited Americans were ready to fight. President Adams was determined to avoid war, but he set in motion a program of preparation. As a first step toward military organization, he summoned George Washington to take charge of the army. The General put on his old uniform and dutifully set off for Philadelphia. There he worked for months to make plans and select competent officers.

Christmas saw him home again for the feasting and jollity. His birthday party in 1799 was a great occasion. The charming Nellie Custis was married to George Washington's nephew, Lawrence Lewis, and Wash-

ington, Nellie's adopted father, gave the bride away.

As the year went on, the hope of peace grew brighter. America's willingness to fight had sobered the French Directory. Talleyrand's high-handed ways had given way to a softer method, and John Adams took a firmer hold on his platform of neutrality. George Washington could relax again, see to his lands and his family, receive his friends, write letters, and read.

Death of Washington. On December 13, Martha was

very cross with her "old man," as she called her celebrated husband. He had ridden out when it was windy and damp, and now he had a cold. He laughed at her anxiety. But that night his throat was closed by a severe attack of quinsy. His old friend and neighbor, Dr. James Craik, came as fast as horse could carry him. The next morning, two other doctors arrived from Alexandria. According to the practice of the times, they bled the patient and gave him remedies to ease his suffering. His wife, his old servant, and his faithful secretary never left his side. But all efforts were in vain. At ten o'clock on the night of December 14, 1799, the master of Mount Vernon breathed his last.

As the news spread across the country, flags were set at half mast. Churches opened for prayer. State assemblies and the national government went into mourning. There were speeches, editorials, and memorial services. But it

was Harry Lee, the "Light Horse Harry" of Washington's military staff during the Revolution, who uttered the perfect tribute to his leader: "First in war, first in peace, first in the hearts of his countrymen."

George Washington was buried in the family tomb on the grounds of Mount Vernon. Two and a half years later Martha was laid beside him. Thousands of pilgrims have gone to that quiet place beneath the trees, and there have reflected on the great American.

Martha Custis Washington (1732-1802) was the daughter of Col. John Dandridge and the widow of Daniel Parke Custis, a wealthy Virginia planter. She married George Washington in 1759.

Martha Washington's first husband had left property that made her one of the richest women in Virginia. She was also a woman of great charm and ability. During the campaigns of the Revolution, she managed the estate at Mount Vernon. She spent the winters at camp with the General, even the terrible winter at Valley Forge.

The Washingtons had no children. Martha Washington



The First "First Lady," Martha Custis Washington, was a woman of great charm and beauty. She fulfilled her social obligations as the President's wife with dignity and grace.

and her first husband had had four children. Two of them, Martha and John, were living at the time of her second marriage. Both died before Washington became President. John's two youngest children, Eleanor Parke Custis and George Washington Parke Custis, were later adopted by the Washingtons.

Martha Washington was accustomed to high social position and to every advantage of wealth and wide acquaintance. She presided over the Executive Mansion with grace and dignity. People often spoke of her as "Lady Washington."

Like her husband, Martha Washington was glad to return to Mount Vernon. She was a gracious hostess to the many visitors who came to see the former President. She never recovered from the shock of Washington's death in 1799. In 1802, Martha Washington was buried beside her husband at Mount Vernon. J.E.

Related Subjects. The reader is also referred to:

Adams, John	Knox, Henry
Autograph	Lafayette, Marquis de
Ball, Thomas	Mount Vernon
Bank of the United States	Painting (Great American
Braddock, Edward	Paintings, color plate,
Brown, Henry Kirke	George Washington)
Custis, George Washington	Revolutionary War in
Parke	America
Dinwiddie, Robert	Stuart, Gilbert Charles
Genét, Edmond Charles E.	Sulgrave Manor
Hamilton, Alexander	United States Constitution
Jefferson, Thomas	Washington Monument

Outline

- I. Introduction
- II. Early Years
 - A. Ancestry
 - B. Boyhood
 - C. Early Education
 - D. A New Home
 - E. Further Education
 - F. Master of Mount Vernon
 - G. Life on the Frontier
 - H. French and Indian War
 - I. Marriage
 - J. Washington the Farmer
- III. Public and Political Career
 - A. Trouble with Great Britain
 - B. First Continental Congress
 - C. Washington Named Commander in Chief
 - D. Making an Army
 - E. Freedom for Boston
- IV. America at War
 - A. The Fight for Independence
 - B. Valley Forge
 - C. France Joins the War
 - D. Victory at Last
 - E. The Commander in Chief Retires
- V. The Postwar Crisis
 - A. Unrest in the New Country
 - B. The Constitutional Convention
 - C. The Constitution Ratified
 - D. Election as President
- VI. Administrations as President
 - A. Financial Policies
 - B. French Revolution
 - C. The United States Starts Growing
 - D. Re-election
 - E. Neutrality Proclamation
 - F. Cotton Gin Invented
 - G. Whisky Rebellion
 - H. A Difficult Decision
 - I. Retirement
- VII. Later Years
 - A. Recall to Duty
 - B. Death of Washington

Questions

In what three important positions did Washington serve his country?

How did Washington get most of his learning?

How wealthy a man was Washington? How did he feel toward the common people?

When and how did George Washington become the owner of Mount Vernon?

When and how did Washington become convinced that the United States should be independent of Great Britain?

Why was Washington chosen to lead the Continental Army?

Why was the winter at Valley Forge called "the darkest chapter in the war for independence"?

How did Washington serve his country in the First Constitutional Convention?

What were the three main problems that Washington faced as President?

What events made Washington "put on his uniform" in 1799?

Who first said that Washington was "First in war, first in peace, and first in the hearts of his countrymen"?

WASHINGTON, LAKE. See SEATTLE, WASH.

WASHINGTON, LAWRENCE (1718-1752). See OHIO COMPANY; WASHINGTON, GEORGE (A New Home).

WASHINGTON, MARTHA DANDRIDGE CUSTIS. See WASHINGTON, GEORGE (Marriage).

WASHINGTON, MOUNT, N.H. See MOUNTAIN (illustration, Highest Mountains of the World); UNITED STATES OF AMERICA (color plate, Majestic Mountain Peaks).

WASHINGTON, STATE COLLEGE OF, is a coeducational land-grant college at Pullman, Wash. It is state-controlled, and has schools and colleges of agriculture, mechanic arts and engineering, home economics, pharmacy, sciences and arts, education, mines and geology, music and fine arts, a graduate school, and a graduate school of social work. The school was chartered in 1890. Its average enrollment is about 4,000.

WASHINGTON, TREATY OF. In 1871 the United States and Great Britain signed the Treaty of Washington at Washington, D.C. The treaty settled a number of disputes between the two countries. It provided that the Alabama Claims should be referred to a special court for arbitration (see ALABAMA [ship]). The court was to meet at Geneva, Switzerland. The settlement of the claims came to be known as the Geneva Arbitration. The treaty also brought an end to quarrels about fishing rights in Canadian waters.

The treaty set down three rules for the court to follow in settling the Alabama Claims. First, it provided that a neutral country should guard against the arming of any vessels within its jurisdiction which might be intended for the use of a country at war. Second, it provided that a neutral country should close its ports to any belligerent which tried to use them as bases for naval operations. Third, it placed on a neutral country the responsibility of guarding against violations of the first two provisions.

The Washington Treaty granted United States fishermen the continued use of the waters off the coasts of Quebec, Nova Scotia, New Brunswick, and Prince Edward Island. British fishermen were granted similar fishing rights along the United States coast north of the thirty-ninth parallel. The treaty also referred the United

States claim to the San Juan, or Haro, Islands, off Puget Sound, to the German Emperor for arbitration. His decision upheld the claim of the United States. J.D.H.

WASHINGTON, UNIVERSITY OF, is a coeducational, state-controlled school at Seattle, Wash. The university includes colleges of arts and science, engineering, nursing, law, mines, pharmacy, education, economics and business, and a graduate school. It also has schools of drama, forestry, fisheries, and journalism which are nationally famous. Women students are housed in dormitories and sorority houses. Out-of-town men students live in fraternity houses or approved rooming houses. The university was founded in 1861. The average enrollment is about 12,000. L.P.Sr.

WASHINGTON AND JEFFERSON COLLEGE is a liberal arts school for men at Washington, Pa. It is controlled by the Presbyterian Church. The school prepares students for advanced training in law, medicine, engineering, scientific research, teaching, and the ministry. The school grew from two institutions, Washington Academy at Washington, Pa., chartered in 1787, and Jefferson Academy at Canonsburg, Pa., chartered in 1794. In 1865 the two schools were united to form the present college at Washington. The college has an average enrollment of about 600. R.C.H.

WASHINGTON AND LEE UNIVERSITY is a privately controlled school for men at Lexington, Va. It offers degrees in arts, science, commerce, law, and journalism. The school was founded as the Augusta Academy in 1749. Its name was changed to Washington Academy in 1798, because of a gift of \$50,000 from George Washington. It received its present name in 1871, in honor of Robert E. Lee, who served as president of the school from 1865 to 1870. The school has an average enrollment of about 900. O.C.

WASHINGTON COLLEGE is a coeducational school of liberal arts and sciences at Chestertown, Md. It is privately controlled, but receives state aid. Courses lead to B.A. and B.S. degrees. The school was founded in 1706 as Kent County School and was chartered as Washington College in 1782 in honor of George Washington, who gave money to the school and served on its board. Enrollment is limited to 350. G.W.Me.

WASHINGTON COLLEGE OF EDUCATION is the name of three teachers' colleges, at Ellensburg, Cheney, and Bellingham, Wash. All are coeducational, and are supported and controlled by the state. They offer the B.A. degree in education.

Central Washington College of Education at Ellensburg was founded in 1891. Besides teacher training, it offers courses in general arts and sciences, as well as preparatory courses in accountancy, nursing, home economics, and the professions. The average enrollment is about 900.

Eastern Washington College of Education at Cheney was founded in 1890 as the Cheney Normal School. It received its present name in 1937. Average enrollment is about 1,000. W.W.I.

Western Washington College of Education at Bellingham, on Puget Sound, prepares elementary and junior high school teachers. It opened in 1899 as Washington State Normal School, and received its present name in 1937. Average enrollment is about 1,000. W.W.Ha.

WASHINGTON CONFERENCE OF 1899. See PAN AMERICAN CONFERENCES.

WASHINGTON CONFERENCE ON LIMITATION OF ARMAMENTS, sometimes called the WASHINGTON NAVAL CONFERENCE. See DISARMAMENT.

WASHINGTON, D.C., NAVY YARD. The Washington Navy Yard was created by act of Congress in 1799, and the original buildings were erected between 1800 and 1804. All the Navy's historic ships of the War of 1812, including the *Constitution*, the *Constellation*, and the *Essex*, were serviced at the yard. The yard served the nation's ships for 145 years. It was abolished by the Secretary of Navy on Dec. 1, 1945. The site is now occupied by the United States Naval Gun Factory. See also UNITED STATES NAVAL GUN FACTORY. R.Col.

WASHINGTON ELM. In 1775 George Washington took command of the American army under a great elm tree in Cambridge, Mass. The tree was named the Washington Elm. It stood for almost 150 years. The passage of time and storms gradually wore it down until little more than a stump remained. What was left of the tree was cut up into souvenirs and distributed among interested persons and groups. A monument was built to mark the place where the tree had stood. J.R.A.

WASHINGTON ISLAND is a small coral island in the north-central Pacific Ocean. It lies about 1,000 miles south and a little west of Honolulu. The island covers an area of six square miles, and has a population of 99 native workmen from the Gilbert Islands. Many coconut palms grow on the island, and some phosphate is mined. Edmund Fanning, an American sea-captain, discovered Washington Island in 1798. Great Britain now owns and controls the island. E.E.Ei.

WASHINGTON MEMORIAL ARCH. See NEW YORK CITY (Recreation).

WASHINGTON MISSIONARY COLLEGE is a coeducational school at Tacoma Park, Washington, D.C. It is controlled by the Seventh Day Adventist Church. The college offers courses in liberal arts, dentistry, engineering, home economics, business, music, nursing, science, teaching, and theology. The average enrollment is about 500.

WASHINGTON MONUMENT is a great obelisk built in honor of George Washington. It stands in Washington, D.C., in a large park near the Potomac River, about halfway between the Capitol and the Lincoln Memorial.

The monument has the shape of the obelisks of ancient Egypt, but it is several times larger than they were. It is 555 feet, 5½ inches high, and measures 55 feet, 1½ inches along each of its four sides at the bottom. The sides slant gradually inward as they rise to the base of the small pyramid, or *pyramidon*, which tops the pillar. At this point each side of the pillar is 34 feet, 5½ inches long. The pyramidon is 55 feet high. The walls of the monument are 15 feet thick at the bottom and 18 inches thick at the top. They are covered with white marble from Maryland and Massachusetts. The stones covering the pyramidon are 7 inches thick. A cap of cast aluminum protects the tip of the pyramidon. Visitors looking from the windows at the 500-foot level have a splendid view of the capital.

Inside, the monument is hollow. The inner walls are set with many memorial stones, some of historic interest. They were given by the states, foreign governments, and various societies. Visitors who want to go to the top of

WASHINGTON NAVAL CONFERENCE

the monument can use the elevator or climb the 898 steps. About 1,000,000 persons visit the monument each year.

A memorial for Washington had been proposed while he was still alive. But Congress refused to build it with government money. In 1833 a group of persons formed the Washington National Monument Society to build the monument. They collected money from the public to help pay for it. By 1848 the society had collected \$87,000. A design by Robert Mills had already been adopted in part. So the society asked the government to pass the law which would permit the monument to be built. After this act was passed, work was started. The cornerstone was laid on July 4, 1848. The work went ahead slowly until 1860. By that time the monument was 156 feet high, and \$230,000 had been collected. Then a block of marble which had been given by the Pope from the Temple of Concord in Rome was stolen. This act so shocked the public that contributions all but stopped. No more work was done until 1876, when Congress voted to finish the monument at government expense. Work again began on August 17, 1880, and the monument was completed on December 6, 1884. It was dedicated on February 21, 1885, and was opened to the public on October 9, 1888. Its total cost came to about \$1,500,000, of which \$300,000 was given by the public.

T.F.H.

WASHINGTON NAVAL CONFERENCE OF 1921.

See DISARMAMENT.

WASHINGTON OF SOUTH AMERICA. See BOLÍVAR, SIMÓN.

WASHINGTON'S RULES OF CIVILITY. See WASHINGTON, GEORGE.

WASHINGTON UNIVERSITY is a privately controlled coeducational school in St. Louis, Mo. The university has a college of liberal arts, a university college, and schools of engineering, architecture, business and public administration, law, social studies, fine arts, and graduate studies. It also has schools of medicine, dentistry, and nursing, and the Henry Shaw School of Botany. Out-of-town students live in dormitories. Many students work part time. The school was chartered in 1853 as Eliot Seminary and received its present name in 1857. Average enrollment is about 7,200.

D.V.M., JR.

WASHITA, WOSH ih tau, RIVER. See OUACHITA RIVER.

WASP. Members of the Women's Air Force Service Pilots were popularly called WASPS, from the initials of their title. The auxiliary was created on September 10, 1942, by Secretary of War Henry L. Stimson. It was first called the WAFS (Women's Auxiliary Ferrying Squadron) and was part of the Air Transport Command of the Army Air Forces. Nancy Harkness Love was commander of the WASPS. Jacqueline Cochran, famous woman flyer, was a prominent member of the organization. More than 1,000 women pilots were trained at Sweetwater, Texas. By April, 1944, WASPS had flown more than 50,000,000 miles, delivering new planes from factory to field, breaking in new planes, and towing sleeve targets for Army Air Force gunners. The auxiliary was discontinued in December, 1944. Similar duties were performed by the Women's Auxiliary Air Force of Great Britain during World War II. E.C.O.



Louie C. Williams

The Washington Monument, national memorial to the first President of the United States

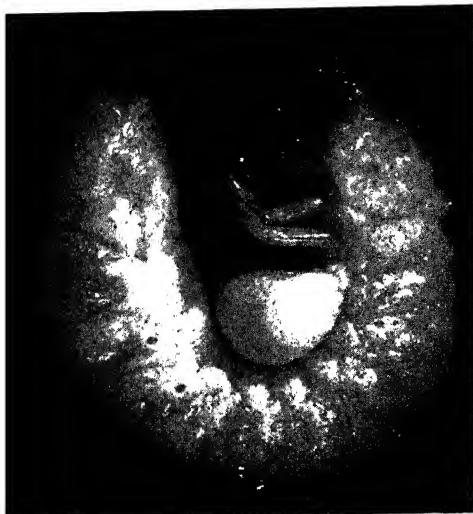
WASP. The wasps are among the most interesting and intelligent insects on earth. They are stinging insects, and related to the bees and the ants. Scientists have written many accounts about how wasps build their nests and care for their young.

Some wasps live in colonies, like ants and honeybees. The colony is made up of different types of wasps — queens, males, and workers — and each type has different work to do. Those wasps that live together and co-operate with one another are called social wasps. Social wasps include the hornets and yellow jackets. Other kinds do not live in communities, but build separate nests. These are known as solitary wasps. All the social wasps have the habit of folding their wings once lengthwise like parts of a fan when they are at rest. Solitary wasps generally hold their wings flat or tilted at an angle over the back.

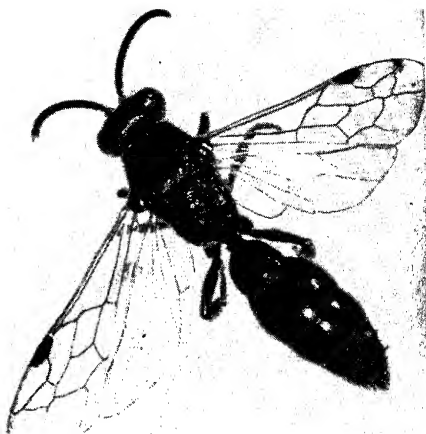
Most wasps are helpful to man. They sometimes damage fruit, but they also destroy large numbers of caterpillars and other harmful insects. They do far more good than harm.

Most wasps have slender bodies and four wings. Different wasps have bodies of different colors. Most often they are steel blue, black, yellow, or reddish. The abdomen usually is marked with crosswise bands or rings. The insect's mouth parts are fitted for chewing hard things and lapping up liquids. Some kinds of solitary wasps have a narrow stalk joining the front and back parts of the body (thorax and abdomen). This thin stalk in the middle gives us the expression "wasp waist." Wasps can give painful stings, but wasps are nervous rather than mean. They sting only when they are bothered or frightened. Only female and worker wasps have the sting. The sting is a thin, pointed drill, hidden in the rear tip of the abdomen.

Social Wasps. These wasps are the papermakers of



The Larva of a Korean Digger Wasp (center) sucks the body juices of the destructive Japanese beetle grub, and kills it.



Julian J. Chisholm, II

The Adult Korean Digger Wasp. This insect was brought to the United States to help control the Japanese beetle.

the insect world. They build their nests of wasp paper, which is a mixture of old wood and tough plant fibers. Wasps chew this material to a pulp, using much saliva. Then they form it into masses like felt. It is then real paper, made of cellulose, just like the paper on which these words are printed. It is said that the Chinese invented paper after watching wasps make it.

The completed wasp nest is made of rows of cells, like those of a bee honeycomb. One group of wasps, the *Polistes*, builds a nest of a single comb, without any protecting cover. But the hornets and their relatives, called *Vespas*, build round or pear-shaped nests with several stories of combs. The outside covering is made of many layers of paper, and will shed water.

Social wasps build their nests in all sorts of places. Single combs can be found in a snug shelter under a porch roof or rafter. Others are in the open, attached to the limbs of trees, bushes, or even weeds. The single-comb nest hangs attached by a short stalk, much like an upside-down mushroom.

There are two types of American hornets and yellow jackets. One has a long face; the other has a short one. The long-faced wasps hang their nests from trees, bushes, roofs, bridge timbers, and overhanging rocks. The short-faced kind builds in the ground or occasionally in stumps.

Unlike a bee colony in a hive, a wasp colony lasts only through the summer. Most wasps store no food, and in the fall all the members die except a crop of young queens. These are the wasps which will be the mothers of new colonies. One spring day a queen comes out of the nook or crevice where she has slept through the winter, and begins to build a new home. First she makes a few cells shaped like cones, and surrounds them with a wall made of two or three layers of paper. In each cell she lays an egg. The larvae which hatch from the eggs are plump, soft grubs. The queen tends them carefully. Every day for about two weeks, she chews up the bodies of insects and brings them to the grubs for food. At last the larvae spin tough cocoons around themselves. Then they go through a change called *pupation*,

and in about ten days they come out of the cocoon as full-grown wasps. They are all workers. After that, the queen does nothing except to lay eggs. These eggs all hatch into worker wasps, until in late summer the queen lays some which develop into males and young queens.

Meanwhile, the workers care for the young and make the nest larger. They tear paper away from the inside of the nest wall and add new layers to the outside. A nest of *Vespas* may finally contain thousands of insects — males, females, workers, and young. Worker wasps have wings. Sometimes, when they are well fed, they can lay eggs.

The larvae of these wasps eat mostly chewed insects. Adult social wasps eat many kinds of food — fruit juices, sirups, and other sweets, and the juices of meat and fish. They feed the solid meat and fish to the larvae. Certain wasps in the tropics feed honey to their larvae.

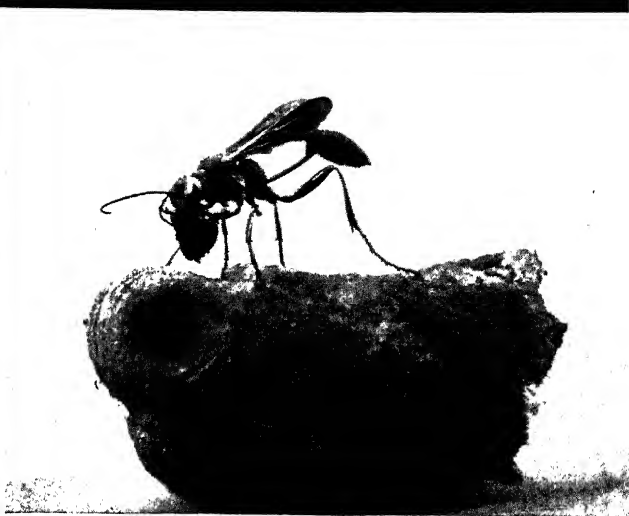
Solitary Wasps. The solitary wasps do not live together in colonies, but in some ways they are even more interesting than the social wasps. They have learned to do so many remarkable things that they seem to think instead of acting by instinct. The social wasps are paper-makers. The solitary wasps are masons, carpenters, and excavators, or diggers. The solitary wasps in one group make homes in the nests of other insects. One amazing thing about most solitary wasps is that they work and sacrifice for their offspring, but they never see them.

There are both potters and stoneworkers among the mason wasps. Some of the potters make mortar out of mud and saliva, and shape dainty mud nests that look like urns. They often fasten two or three little jugs upon one twig. The "mud daubers" work up mud with the saliva, and build their nests in the form of little tube-shaped cells. They plaster these nests on the underside of a porch roof or some other protected place. The stoneworkers mix pebbles with the mortar. They build their nests on surfaces of rocks in the open. Carpenter wasps tunnel into the wood of trees or old posts, or bore into the stems of herbs. There are also earth-miner and digger wasps. They dig tunnels running down into the ground.

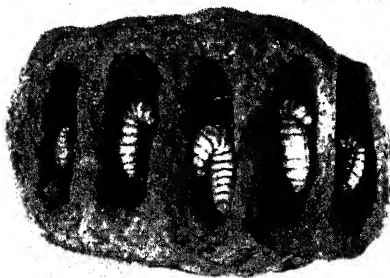
There are no separate workers among the solitary



Organ-Pipe Nest of Mud Wasp



A Mud Dauber and Nest Built in Form of a Mud Ball



Cellular Wasp Nest and Eggs Mud Dauber's Nest Opened to Show Construction Jug Nest of a Mud Wasp

Photos: L. W. Brownell; Cornelia Clarke; U.S.D.A.

wasps. The female builds the nest and gathers the food. She uses her strong jaws, or *mandibles*, to bore, dig, and carry material back and forth. When the nest is finished, the wasp flies out to catch insects for her hungry larvae. Wasps eat caterpillars, spiders, beetles, flies, ants, or other insects. The larva of each type of wasp has a certain insect it prefers. The adults eat nectar and fruit juices, but the young must have spiders or insects, and they like their food alive. The mother wasp usually does not kill her prey, but stings and paralyzes it.

A wasp makes her victim helpless by piercing its nerve center with her sting. Sometimes a wasp kills her victim outright. At other times she stings it so poorly that later it becomes active again, and completely recovers. But the young wasps eat it just the same.

After she stings and paralyzes her victim, the wasp drags it into the nest. Then she goes out for more. When she has collected a large enough supply, she lays an egg on one of the bodies, and seals up the nest. The larva hatches in a few days and finds an ample supply of fresh food. The larva feeds on the insects until grown and then spins its silken cocoon. When the wasp is in the cocoon it is called a pupa. It may remain a pupa only two or three weeks, but often it stays that way through the winter. At the end of the pupal stage the

wasp gnaws its way out of the nest, and comes out a full-grown insect.

One of the larger digger wasps builds an underground burrow with side tunnels where it cares for several larvae at the same time.

Scientists have studied the digger wasps called *Amphiphila* with special care. They are easy to find and live in many places. The female digs a burrow several inches deep. This hole ends in a rounded part where she stores caterpillars. After she lays an egg, she fills the tunnel with bits of earth, and then tamps down the entrance. She makes the surface as smooth as possible. *Amphiphila* wasps have been seen using small pebbles to tamp the earth. Scientists think that no other animal uses a tool in this way. C.D.D.

Classification. Wasps are insects of the order *Hymenoptera*. They are divided into superfamilies. The best-known are *Vespoidea* and *Sphecoidea*. The first includes all the social species, some of the parasitic kinds, most of the mason and carpenter wasps, and a few diggers. *Sphecoidea* includes most of the diggers and mud daubers. The hornets, yellow jackets, and *Polistes* are in the family *Vespidae* in the *Vespoidea*. The short-faced hornets of the genus *Vespa* belong to the subdivision *Vespula*. The long-faced kind are *Dolichovespula*. Fig wasps are members of an entirely different superfamily, a group com-

monly known as chalcis flies. They are not considered true flies, however.

Related Subjects. The reader is also referred to:

Ant	Fig (Smyrna Fig)	Sawfly
Bee	Hornet	Yellow Jacket
Bumblebee	Ichneumon Fly	

WASSAIL, WOS'L. See CHRISTMAS (Christmas in Other Lands).

WASSERMANN, VAHS er mahn, AUGUST VON (1866-1925), was a German physician and bacteriologist. In 1906 he originated the famous Wassermann test to determine the presence of the disease of syphilis. He was born in Bamberg, Germany, and became director of the department of experimental therapy at the Kaiser Wilhelm Institute near Berlin in 1913. See also VENEREAL DISEASE; WASSERMANN TEST. B.J.

WASSERMANN TEST is a blood test used to find out whether a person has syphilis. It was discovered by the German bacteriologist August von Wassermann. In making the Wassermann test, a sample of the person's blood is first drawn out with a hypodermic needle. This sample is then treated in a medical laboratory. If a person has syphilis, his blood has formed antibodies, which fight the germ. The blood can be mixed with substances which will join these antibodies. In doing so, they cause certain changes in another part of the blood, called the complement. If the complement is bound, or fixed, it shows that the blood has formed antibodies, and gives a *positive Wassermann test*. If the syphilis infection is absent, the complement is usually free, and the test is *negative*. The Wassermann test is not absolutely certain, but in more than 95 per cent of early cases it will give a positive test. It is also one of the ways the doctor determines when a person has finally been cured of syphilis. See also VENEREAL DISEASE; WASSERMANN, AUGUST VON. W.W.B.

WASTE. See CONSERVATION.

WATAUGA ASSOCIATION. This group of early American settlers drew up the first written constitution adopted west of the Allegheny Mountains. In 1769 a party of settlers established a colony on the banks of the Watauga River in what is now the state of Tennessee. The men thought their settlement was within the boundaries of the colony of Virginia. But in 1771 the Watauga settlers discovered that their territory was within the limits of the colony of North Carolina. North Carolina refused to give legal protection to the settlers. The new settlement was frequently attacked by Indians, and there was no recognized legal authority. Finally the Watauga pioneers decided to keep order by organizing their own government. The leaders of the movement were two frontiersmen named John Sevier and James Robertson.

In 1772 the Watauga settlers became the first group of American-born men to form a free and independent community. They drew up a document which they called the *Articles of the Watauga Association*. The Articles provided for an executive council, a legislature, a sheriff, and an attorney. In 1776 the community, known as the Washington District, sent representatives to the assembly of North Carolina. Later the Watauga community became part of the state of Tennessee. J.R.A.

See also TENNESSEE (History).

WATCH, a nautical term. See NAVY (Day in the Life of a Sailor).

WATCH. Watches help us do things and get to places at the right time. Small children often carry cheap watches to be sure they will be on time for school. Railroad engineers carry expensive watches which are carefully adjusted to make sure that their trains run on time. One hundred years ago watches were expensive. Now, through mass production, a fairly reliable watch can be bought for little more than one dollar.

A watch is really a clock that is made to be carried about. The first watches were large and heavy. The first watch is supposed to have been invented about 1500 by Peter Henlein, or Henle, a locksmith who lived in Nümburg, Germany. For this reason, and because of their round shape, the first watches were often called Nümburg Eggs. Clocks run by weights were used before that time, but development of the watch depended upon the invention of the mainspring. The mainspring provided the power to turn the wheels. At first a straight mainspring was used in the watch, but this soon gave way to the coiled spring used in modern watches.

Early watches often were made in fanciful and elaborate shapes, and were highly decorated. They were extremely expensive. The watch was steadily improved, and the minute hand was developed in 1687. In the late 1800's, the development of machinery made it possible to produce accurate watches cheaply. The average low-priced watch of today contains over a hundred different parts. Many fine watches are still made by hand.

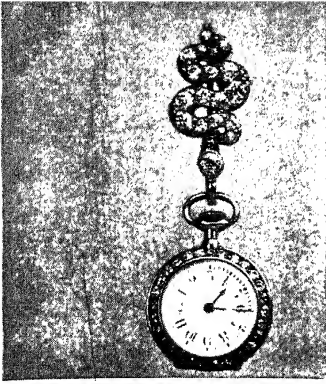
The manufacture of watches by hand began in Germany and soon spread to England, Switzerland, France, and Italy. Switzerland is still one of the most important watchmaking countries in the world.

Kinds of Modern Watches. There are many different kinds of modern watches. These watches are suited for a great many different purposes. The two major types are pocket watches and wrist watches. Other smaller types of watches have also been developed for special purposes such as ornaments for women's dress. The large pocket watch was the most common type of watch for men until World War I. Some pocket watches were made with a hinged cover which protected the face. Such a watch is said to have a hunting case.

Wrist watches became popular during World War I. They are now made in a variety of styles for both men and women. Some wrist watches do not need to be wound. The normal movement of the arm keeps the watch running.

Most watches have dials which show the passage of hours and minutes by means of two hands. A smaller hand may or may not be used to show the passage of seconds. The dials of some watches may be painted with substances containing radium, so that they show the time as readily in darkness as during the day. Some of the most elaborate wrist watches not only tell the time of day, but also tell which day, which month, and which year it is. The best watches have moving parts whose bearings are made of jewels. At one time these were genuine jewels, such as the diamond, ruby, and other precious stones. Such watches contain from seven to twenty-three such jewels. At present most of these jewels are artificial.

Some Unusual Watches



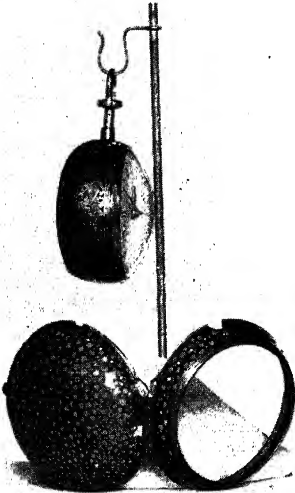
American Lady's Watch of 1880-1900 is decorated with diamonds.



French Watch of the 1600's. Picture of Antony and Cleopatra is in enamel.



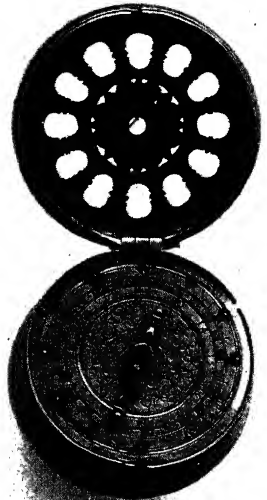
Silver Skull Case Watch made in France during early 1600's



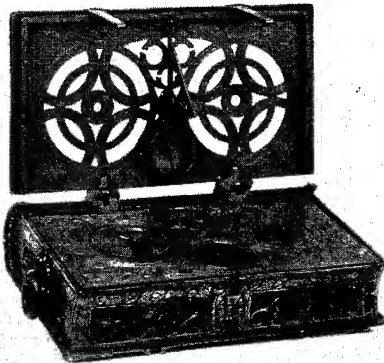
English Watch of the 1700's, with case, has chimes to strike the hours.



Austrian Watch of the 1800's. The case is enameled gold in the shape of a shell.



German Brass Watch of about 1560 has one hand. It tells quarter hours.



German Watch of the Late 1500's. The elaborate engraved metal case is made in the shape of a book.



Austrian Watch in an Oval Case made in the 1800's. Decorations on face and inside cover are exquisite enamels.

Photos: Metropolitan Museum of Art; Boston Museum of Fine Arts

WATCH

Modern watches are wonderfully accurate. An ordinarily good watch will keep time within one-half minute per day. This means that its error of running is one part in 2,880, or less than $\frac{1}{1000}$ of 1 per cent.

How the Watch Tells Time. There are two essential parts to any watch. One is the *case* and the other is the *works*, or *movement*, inside the case. There are four important parts to the works. The *frame* supports the rest of the works. The *power unit* provides the force needed to keep the wheels turning. The *train* is the system of wheels which turn and carry the power from one wheel to another. The *escapement* regulates the speed at which the watch operates.

The frame of most high-grade watches is made from heavy metal plates. The frame of cheaper watches is usually made of two rather thin plates of metal. These two frames are held apart by means of pillars, which are merely posts of brass which help to serve as a framework.

The power unit of the watch is the mainspring. This spring is a thin ribbon of highly tempered steel. The mainspring is inside a barrel which has teeth on its outer edge so that it can serve as a gear wheel. There are two general types of barrels found in watches, the *going barrel* and the *winding barrel*. The going barrel revolves during the running of the watch. The winding barrel revolves only when the spring is being wound. In the winding barrel, the axle or arbor which passes through the barrel turns a main wheel which drives the other wheels of the watch. The stem-winding mechanism of the watch turns the arbor or the teeth of the barrel. By means of gears and by turning the crown between the thumb and the finger, the spring of the watch can be tightened and wound to operate the watch for a day or more.

The train of the watch consists of a suitable number of wheels and pinions. These mesh with one another. They provide a means by which the very slow motion of the barrel produced by the mainspring is carried throughout the various parts of the watch. This causes the hands of the watch to go around at the proper speed.

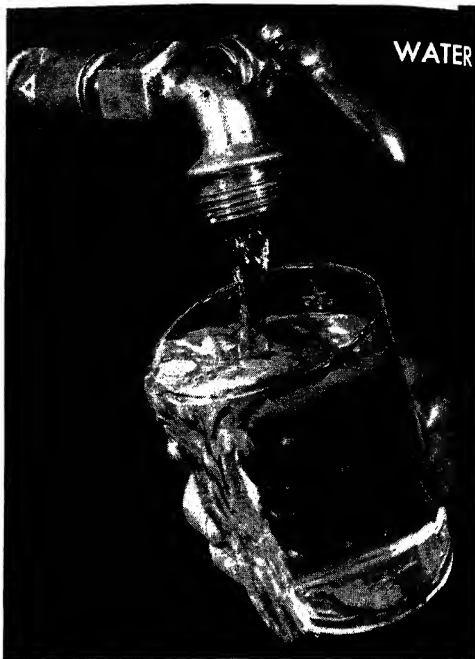
In the train there is a wheel called the center wheel, which is always in the center of the watch. It is connected with the wheels which drive the second, minute, and hour hands. This is done by means of various ratios between the number of teeth and the size of the various wheels in the train. The motion of the train is finally carried through to the escapement, which controls the speed of the train. The escapement governs the speed at which the watch will run. The *balance wheel* is the essential part of the escapement. It is fitted with a delicate spiral spring called a hairspring of very thin steel. At each turn of the balance wheel, one of the peculiarly shaped teeth of the escape wheel passes the locking of the escapement lever. This controls the rate of running of the watch. The rate at which this escapement turns is regulated by a pointer which can be moved along a small scale to make the watch run either faster or more slowly.

R.E.Go.

WATCHDOG OF THE TREASURY. See WASHBURN, ELIHU BENJAMIN.

WATCHFUL WAITING. See WILSON, WOODROW (Administration as President [Mexican Problems]).

WATCH ON THE RHINE. See WACHT AM RHEIN.



WATER is so easy for most people to get that they seldom think how necessary it is for man, animal, and plant. But the pioneer of Daniel Boone's day had to hunt for a never-failing spring or brook before deciding upon a spot for a cabin. Bitter battles have been fought for the possession of some muddy water hole or tiny stream which would furnish this liquid without which man and his animals quickly die.

Next to the air we breathe, water is probably the most important thing in our lives. Without it, we would die. The bodies of living animals and plants contain more water than any other substance.

One of the chief concerns of a farmer's life today is that the season shall bring enough rain to supply the necessary water for his thirsty plants. Almost every modern factory uses great quantities of water in its many operations. The modern home with its facilities for bathing, cooking, and washing dishes, uses a great many thousands of gallons of water during a year. Often the least expensive way of moving freight is to carry it in boats on water—rivers, lakes, or oceans. Civilization has arrived at that stage when the people demand that many of the stores, hotels, and office buildings shall be air conditioned. This again calls for water to cool or moisten the air. Life would be very drab and uninteresting if there were no brooks, rivers, ponds, lakes, or oceans to break the monotony of the landscape and afford means of healthful recreation. In all these ways water is important in our lives.

What Water Is and How It Behaves

The chemist describes water as a practically colorless liquid with the formula H_2O . This means that each tiny molecule of water contains one atom of oxygen and two atoms of hydrogen. Hydrogen, by itself, is a very light gas which is frequently used to inflate balloons or air-

ships. Oxygen is another gas, which makes up about 20 per cent of our atmosphere. All animal life needs oxygen. Without it a person would die in a few minutes. When hydrogen and oxygen are thoroughly mixed, they can be ignited, or made to burn, with a spark. They will unite with an explosion and form water. Probably the greatest mass demonstration of this chemical reaction ever seen took place on the evening of May 6, 1937, when the hydrogen gas of the German airship *Hindenburg* caught fire and burned completely while this great dirigible was landing at Lakehurst, N.J. The chemical product (hydrogen plus the oxygen of the air) of this disaster was the common substance, water. Each pound of liquid water produced uses about ten cubic feet of oxygen gas and twenty cubic feet of hydrogen gas in being made.

Heavy Water. Water contains about one part in 4,500 of a rare substance known as "heavy water" which is about 11 per cent heavier than ordinary water. The greater weight is caused by the fact that the hydrogen atoms in this form of water are twice as heavy as ordinary hydrogen atoms. Heavy water is of great scientific interest and is of great value in studies of many chemical reactions and life processes. The Nazis used it in their atomic research during World War II.

Ice is simply solid water. Any substance, even a gas, becomes solid when it is cooled to a low enough temperature. But ice is a most unusual solid, for it is less dense than the liquid from which it was formed. Therefore it will float on water. In other words, water expands when it freezes. This is most fortunate, for if it were not true, the ice that is formed in cold weather would always sink to the bottom. Rivers, lakes, and even a large part of the ocean would freeze solid in the winter time. There would be no fish, and very little of any other kind of water life.

Solid water may appear in forms other than large compact pieces of ice. The frost on the window pane is merely a thin layer of ice crystals formed from the water vapor in the air. Snow, sleet, and hail are bits of solid

water, or ice, which have been frozen from the droplets of water in clouds.

Surface Tension. Liquid water, as well as all other liquids, exerts a *surface tension*. The molecules on the surface cling together very tightly and try to pull the whole mass of liquid into as small a space as possible. This surface layer acts very much as the rubber envelope of a balloon does. It pulls water into globular form, like raindrops. If a steel needle is carefully placed lengthwise on the surface of a glass of water it will float, even though steel is several times denser than water. If you look carefully, you will see the surface film bending down under the weight of the needle.

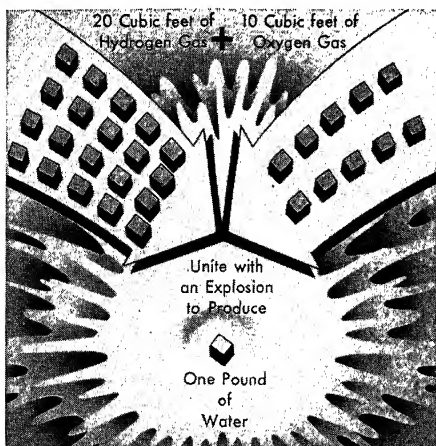
Evaporation and Boiling. Because water has this tight layer, the surface of a tumbler of water appears to be inactive and quiet. Actually, it is in a highly active state. Untold numbers of molecules are leaving the surface of the water and going into the surrounding atmosphere every instant, like people rushing from a stadium after a football game. These escaping molecules become *water vapor*. It is actually water in the gaseous state. This process of losing molecules from the liquid is called *evaporation*. Water left standing for several days in a tumbler in a room at ordinary temperature will completely disappear. All the molecules will have escaped through the liquid surface layer and will have become free, wandering, invisible molecules of gaseous water in the air of the room.

If this same tumbler of water were placed in bright sunshine on a summer day it would become quite warm and it might all evaporate in a few hours. This shows that the speed of evaporation increases markedly as the temperature increases. In other words, when liquid water is warm the molecules are exerting more pressure to break through the surface than when it is cold. This pressure of the molecules coming from the liquid surface is called *vapor pressure*.

If a pan of water is placed on a stove it becomes hot, and bubbles of water vapor, now called *steam*, rise through the liquid. We say that the water is *boiling*. Boiling occurs when the vapor pressure of the liquid equals the pressure of the atmosphere above it. The water is then able to push the air completely away from its surface. The lower the pressure, the lower the temperature at which water will boil. At sea level the pressure of the atmosphere is 14.7 pounds per square inch and water boils at 212° Fahrenheit. On top of a mountain 10,000 feet high, the atmospheric pressure is only about 10 pounds per square inch, and water boils at 194° F. For this reason it takes much longer to prepare a hard-boiled egg on a mountain than it does at sea level.

If water is heated hotter than 212° F., its vapor (steam) exerts more pressure than that of the atmosphere at sea level. This fact is used in boilers, where steam is generated under high pressure to drive the engines and turbines of modern industry. The pressure in some modern boilers is as much as 150 times that of the atmosphere outside the boiler.

The changing of water from liquid to vapor requires a great deal of heat. When a pound of water is evaporated it absorbs as much heat as it takes to raise the temperature of five and one-half pounds of water from the freezing point to the boiling point. Hence it is possible to cool



When Hydrogen and Oxygen Are Mixed and ignited by a spark they explode violently. The reaction produces water.

an object by allowing water to evaporate from it. This cooling effect of evaporation is very important to human life. Warm-blooded animals, such as man, have to be equipped with some sort of temperature-controlling device to keep the body at about the same temperature all the time. The human being is one of the few animals that has the privilege of being completely water-cooled. Perspiration is always coming to the outer surface of the body through tiny pores. It evaporates there and the heat required for this evaporation is taken from the body and thus keeps it cool.

Water under Pressure.

Most liquids can be compressed only very little, even under high pressure. Water is no exception. Under a pressure of 175,000 pounds per square inch, liquid water is compressed only about one fifth, or 20 per cent. But under such pressures strange things begin to happen. Ice will freeze in one of seven different forms, the form depending on the pressure.

The Work of Water

Water Shapes the Surface of the Earth.

At one time, all the present solid substance of the earth was a hot liquid. This later cooled to solid hard rock, such as granite. Water and ice have been the chief forces in cutting the hills, mountains, and valleys, and making fertile soil out of the original rocks. These processes of *erosion* have been going on for millions of years and will continue as long as there is water on the earth. The rain dissolves or washes away small bits of rock and carries them downstream to some valley or river bed where the water runs slowly and drops its sediment.

This process of erosion in the past has helped to form the broad smooth fields which are fertile farm lands. But it is now threatening to destroy the very fields which it made. Every heavy rain carries away much of the fertile topsoil, as every muddy river shows. Water erosion takes away some 3,000,000,000 tons of topsoil from the fields and pastures of America every year. This mass of rich topsoil would fill the cars of a freight train 475,000 miles long, enough to go around the earth nineteen times at the equator. This soil contains 40,000,000 tons of the essential fertilizer materials—phosphorus, potassium, and nitrogen. Water erosion has already destroyed about one fourth of our fertile croplands. Most of this waste could be prevented by following careful methods of farming and grazing.

In winter and early spring, anyone can observe how

ice forms in cracks in rocks and pushes off small pieces to help in this process of wearing down. In many high mountains in Europe, Asia, and the Americas, there are glaciers, or rivers of ice, that never melt. All of Antarctica, and almost all of Greenland, is covered with an immense glacier. Many thousands of years ago, three

great continental glaciers spread down from the Arctic Circle, over more than half of North America. They left marks which are particularly noticeable at points where they stopped. The ice did not melt for thousands of years. It is thought that there were still remnants of these glaciers not more than ten or fifteen thousand years ago in this area that is now the United States.

The Solvent Action of

Water. Water *dissolves* many substances and the mixture is called a *solution*. Water will not dissolve everything, but it will dissolve so many different kinds of compounds that it is sometimes called the *universal solvent*. Hence, every time the water runs off over the surface or trickles through the ground, it dissolves some of the substances there and eventually carries these to the ocean or an inland lake.

When the sun evaporates the water from such bodies, the dissolved material is left behind. That is the reason there is salt in the ocean. It was carried there from the land in water solution.

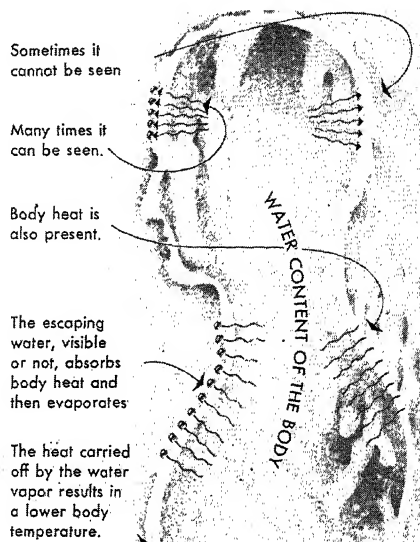
The ocean and many inland lakes, such as Great Salt Lake in Utah, have long served man as sources of common table salt. But there are many other materials besides common salt which are found in the bodies of water. A factory at Wilmington, N.C., takes the chemical bromine out of sea water to use in ethyl fluid in anti-knock gasoline. Factories in California, Texas, and England extract the metal magnesium from sea water. Many valuable chemicals, such as potash for fertilizers, are extracted from landlocked waters.

Water has also played an important part in concentrating many of the solid mineral deposits, such as the great beds of iron ore in Minnesota and Michigan. Man would not find it easy to get at the mineral wealth of the world had water and ice not been working at their processes of concentration for millions of years.

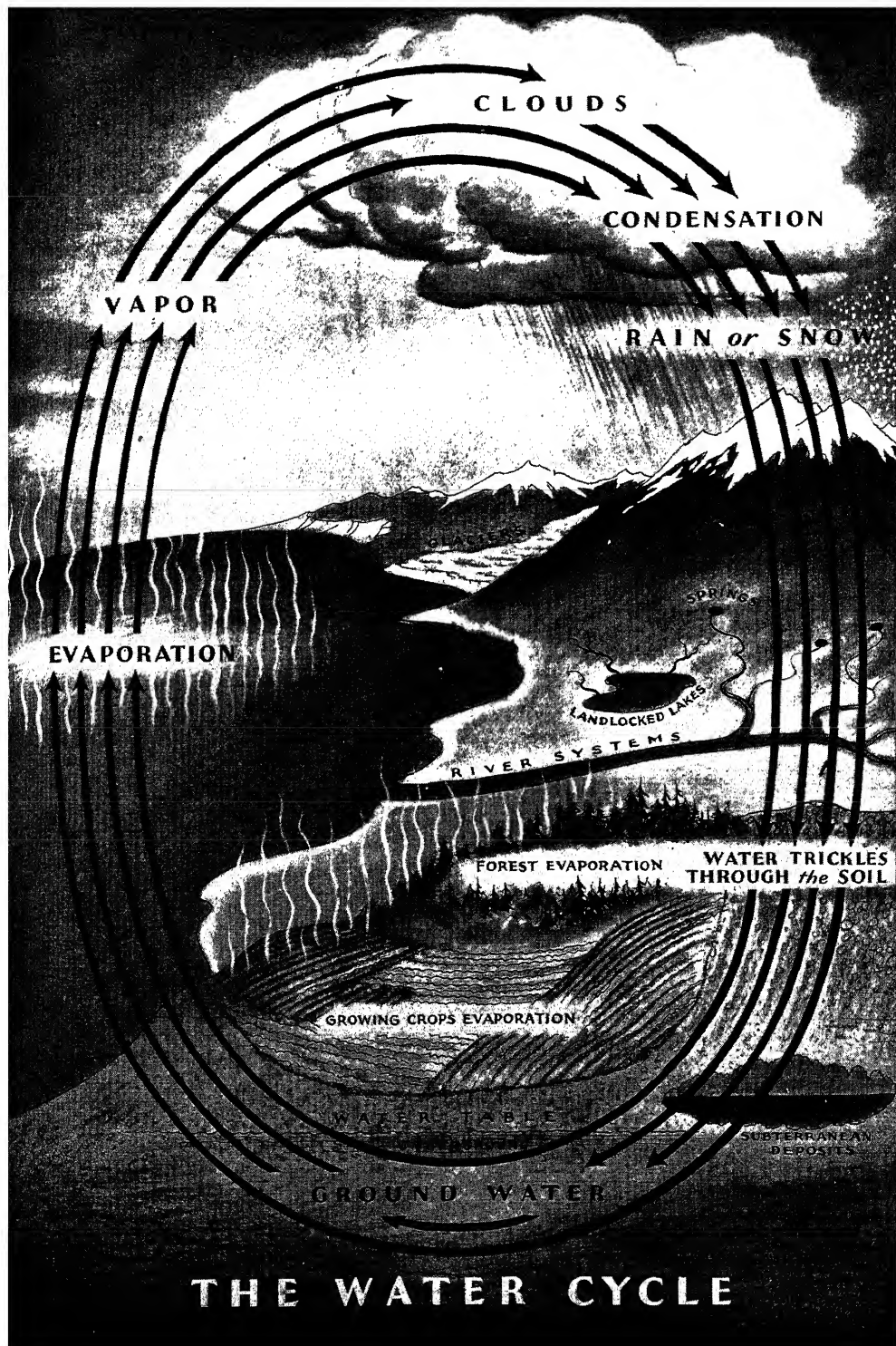
Water in Living Cells

Over two thirds of the human body is water. Blood is 90 per cent water, and even muscles contain 80 to 90 per cent. This water is so essential for life that a loss

WATER, CALLED PERSPIRATION, IS CONSTANTLY LEAVING YOUR BODY

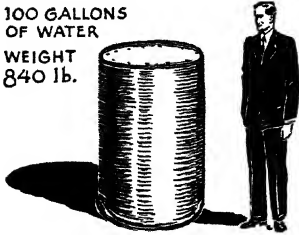


The Human Body is a Water-cooled Machine



of less than 20 per cent of it will result in painful and horrible death. A normally healthy person can live only seven to ten days without water. The longest recorded length of life on the ocean without water is eleven days. To keep his water supply up to normal, the average man takes in about a ton of water each year, either as

100 GALLONS
OF WATER
WEIGHT
840 lb.



AVERAGE
WEIGHT
120 lb.

More than 100 Gallons of Water—nearly half a ton—is used by the average city dweller per day.

pure water which he drinks or in the food he eats.

Every living thing must have more or less water. Water solutions of some sort carry the food and take the wastes away from the living cells of even the most complicated living animal. The insides of plants and animals are largely taken up with the multitude of waterways which carry, in a dissolved state, the substances essential for living. These dissolved substances move in or out through the walls of the living cells by the complicated process of *osmosis*, which is the diffusion of dissolved substances through a membrane. See OSMOSIS.

The Natural Water Cycle

About three fourths of the surface of the earth is covered with water. It has been estimated that the amount of water on the surface of the earth is about 1,400,000,000,000,000,000 tons. The bulk of this water is in the ocean, which is not made of pure water, but contains a great deal of dissolved material, chiefly common salt. This dissolved material in the ocean (about 3.5 per cent of its weight) has come from the surface of the land. For hundreds of millions of years, rivers have been pouring into the ocean, carrying in small amounts of salt and other materials all the time.

Rainfall. Under the warming influence of the sun, about $\frac{3}{10}$ of all the water on the surface of the globe is evaporated each year. All this disappears into the constantly moving air as water vapor. When a mass of warm air carrying a large amount of vapor strikes a colder mass of air, the vapor condenses out as very tiny droplets of liquid water which we see as clouds, or fog. When conditions are just right, these tiny droplets join together to form raindrops which fall to the earth. Hence all the water has at some time or other come from the ocean, even though it may be a thousand miles away. The total amount of water on the earth never changes. It merely changes its form and moves from place to place.

The average annual rainfall in the United States is 1,500 cubic miles of water, almost 7,000,000,000,000 tons. About two thirds of this falls on the eastern half of the country, about one third on the western half.

Water Currents in the Ocean. England is a country with a very mild climate. Yet all of England is much closer to the North Pole than any part of the United States. However, England and the whole western coast of Europe has a sort of hot-water heating system that comes up from the tropics. This convenient heating system is the Gulf Stream, a great current of warm water that flows in the Atlantic Ocean from near the equator, past the West Indies and the coast of Florida, across the ocean to the western coast of Europe. This ocean stream has been keeping that part of the northern world warm for many thousands of years. The history of the world would have been very different without this warm ocean stream. The northern part of Europe would have been so cold that no great civilization could have developed there.

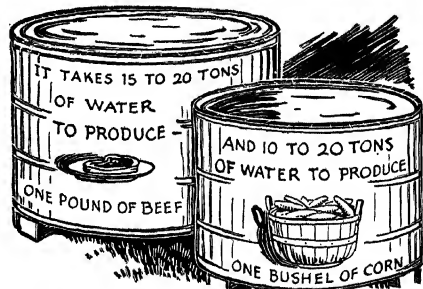
Large bodies of water nearly always have a moderating effect on the neighboring land areas if the land lies in the path of the prevailing winds. For instance, the climate of the land to the east of the Great Lakes in the United States is milder than that to the west, because the prevailing wind is from the west.

Water under the Ground. As the rain falls, some of the water is soaked up by the ground, and some of it runs off immediately. Because water always tends to run downhill, it finds its way to brooks, then to larger streams, to rivers or lakes, and finally back to the ocean. Thus water is continually going round and round the circle of ocean, clouds, small streams, rivers, lakes, and oceans. It has been doing this for millions of years and perhaps will always continue to do so as long as the world we know exists.

Of course all of the water does not run directly back to the ocean after it falls as rain. Some of it stays locked up under the ground for long periods of time. Some is evaporated from the small streams, rivers, and lakes to become water vapor to help swell the local clouds. Plants take up an enormous quantity, most of which evaporates through the leaves. But these are side trips in the journey, and only delay the return back to the ocean.

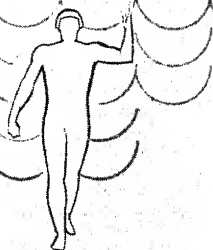
The soil acts as an enormous storage place for water. The underlying layers of clay or sand and the cracks in the rocks store up great quantities of water. All of this will eventually go back to the ocean. It is thought that some of this water has been under the ground for thousands of years, and may even have come down as rainfall before human history began.

This *ground water* is the source of supply for the springs



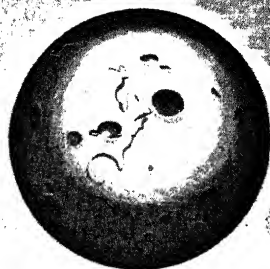
The Importance of Water in Food Production

IMPORTANCE OF WATER TO MAN



Your body is two-thirds water.

Without water, the earth would be a lifeless planet like the moon.



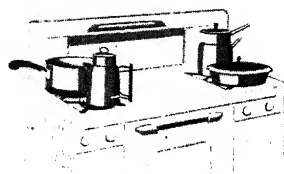
USES IN YOUR DAILY LIFE



Life and health depend on the water taken into the body each day.



Cleanliness made possible by use of water guards your body from disease.



Preparation and cooking of food require a plentiful supply of pure water.

Water is the medium by which food is carried in the body and by which wastes are removed.

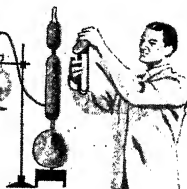


Water cools the body by evaporation from the sweat glands.

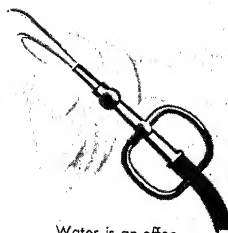
USES IN SCIENCE AND INDUSTRY



Water is the all-important solvent in construction work and in manufacturing processes.



Science and medicine rely heavily on chemical formulas which use water.



Water is an effective way of fighting most fires.

Recreational Facilities...



WATER PROVIDES THE WORLD WITH

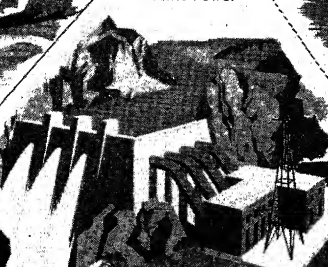
Irrigation



Transportation



Electric Power



Steam



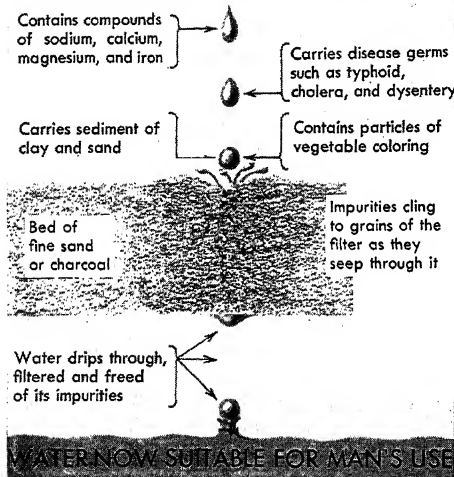
that trickle out of hillsides, and for the wells that we dig. Even the middle of the Sahara is not without water, for there are occasional oases where the layer of underground water comes to the surface in natural springs or in man-made wells. The source of supply is the mountains, hundreds of miles away.

In many parts of the world there are *artesian wells*, where the ground water has such high pressure that it will flow out without being pumped.

Purifying Water

Absolutely pure water is a very rare substance. Since water easily dissolves many substances, a great many of these are always present in natural waters. The most common impurities are compounds of the chemicals sodium, calcium, magnesium, and iron. Fortunately none of these are harmful, in small quantities, to human beings. On the other hand, many disease germs, such as those of typhoid, cholera, and dysentery live in water.

WATER NOT SUITABLE FOR MAN'S USE



In addition, natural water often contains sediment of clay or sand, and vegetable coloring material or even tiny animals which makes it undesirable for human, or even industrial use.

To remove the disease germs and the undesired sediments, water which comes from lakes or rivers or even from some wells must be purified for human use. This is commonly done by allowing it to trickle through such material as beds of fine sand or charcoal. This is called *filtering*. Germs and particles of fine sediment cling to the sand grains and the purified water then passes on through.

In many cities the water is purified by treating it with very small quantities of chlorine gas. Enough chlorine is put into the water to kill any disease germs present, but not enough to injure people or animals. Sometimes both filtration and chlorination are used to assure a supply of pure water.

Softening Water. Many parts of the country have only *hard water*. When soap is put in hard water, a solid curd

forms. It is difficult to get a lather from the soap. This action is due to the presence of certain of the dissolved substances, usually some form of lime, in the water. Various means are used to counteract the effect of these substances. Washing powders are available as household softeners of water. The materials they contain partly counteract the effect of the limey materials in hard water. Heating water to boiling temperature sometimes causes part of the lime compounds to turn to solids which fall to the bottom of the water. This eliminates some of the hardness.

Rain water contains no dissolved solid matter and so is *soft*. That is why rain water is caught and stored and is much used for washing purposes in some places where the water from the ground is very hard.

Ordinarily, sea water is not fit for humans to drink because it contains a large amount of dissolved substances, the bulk of which is common salt, or sodium chloride. But modern science has found a way to make even sea water fit for human drinking. Up-to-date lifeboat equipment now includes "desalting kits" which consists of a plastic bag to be filled with sea water. A solid chemical is dropped into the water. This chemical changes the soluble material in the water into insoluble substances which can be filtered out at the bottom of the bag, leaving relatively pure water behind.

Water Power

Water always runs downhill if it can. Anyone who has ever observed the destructive effect of a river in flood knows that this force of water can exert vast power. When it is harnessed, it can be turned from destruction to useful work.

About one third of the total electrical energy in the United States is supplied by water-power plants with electric generators. The amount of energy harnessed by water-power plants in the United States in 1944 was equal to the energy which could be produced by about 250,000,000 men working continuously. That is about five times the number of able-bodied men in the country. Electrical power is truly the modern slave. With the flip of a switch one can do more than Aladdin in fairy tales could do with his lamp. The prospects are that the amount of electricity produced by water power will be even greater in the future.

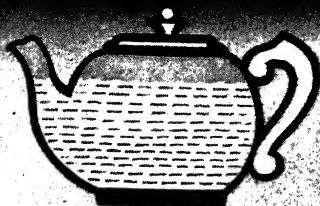
The Thirsty Plants

It takes 1,000 pounds of water on the average to produce one pound of food, for plants are very thirsty. From the time a plant starts to grow until it dies it is sucking water out of the ground with its roots and allowing it to evaporate from the undersurface of the leaves. That is the way it feeds itself. From ten to twenty tons of water must pass through the corn plants to produce one bushel of corn. If we consider the amount of water used by the plants which cows eat, we are justified in saying that the production of one pound of beef takes fifteen or more tons of water. During the growing season a good corn crop uses up fifteen inches of water from the ground. On a warm summer day the movement of water through a large tree is rapid. As much water is being evaporated from its leaves as a strong man, with two buckets and a ladder and working as hard as possible, could carry

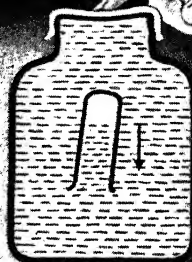
SOME EXPERIMENTS WITH WATER



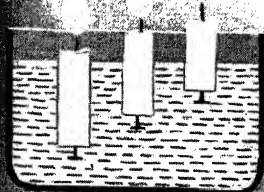
Holes Are Punched in a Container of water, the water will squirt farthest from the lowest ones, because the farther below the surface you go, the greater the pressure becomes.



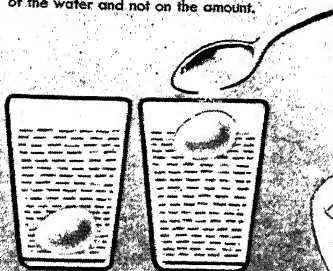
Water Stands at the Same Height in the teapot itself and in the spout, because the levels depend on the depth of the water and not on the amount.



A Small Vial with just enough air in it to float upside down is forced to the bottom of the jar when the metal cover is pressed. The pressure forces more water into the bottle. This makes it heavier and it sinks.



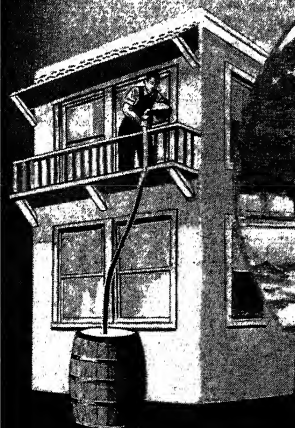
A Floating Candle, balanced by a nail at the bottom, rises higher and higher in the water as it burns because it becomes lighter in weight and thus displaces less liquid.



An Egg Sinks in Fresh Water because its density is greater than that of the water. But if the density of the liquid is increased by adding salt to it, the egg will float in it.



A Needle, safely razor-sharp or paper tip carefully placed on the water's surface will rest there. It is supported by the skinlike surface of the liquid.



If a Strong Hose leading from a great height to a closed barrel were filled with water, the weight of the liquid would create enough pressure to burst the barrel.



When This Boy Lands on the water in this position he learns several things about water. It has surface tension, it cannot be compressed, and it is not displaced as easily as air.



Dripping Water demonstrates surface tension in liquids. As the thin stream flows out, the action of surface tension pinches it off in small sections, to form drops.

from the ground level up to the very top of the tree.

Water in Industry and Transportation

Nearly all industries are thirsty organizations; they require a great deal of water. Steel mills, where iron is extracted from ores and melted in furnaces, must have quantities of water to keep the furnace walls cool. Paper mills use tremendous amounts in the processes of making paper pulp from wood. Dye works, chemical plants, brass mills, textile mills, and almost all kinds of factories use a great deal of water for cooling purposes, for making steam, for washing, cleaning, or chemical processing. A good water supply is one of the first items to be considered in the location of a factory.

Man's first means of easy travel for himself and his goods seems to have been small boats on river and lakes. Later he ventured in larger boats on to the inland seas and eventually on to the ocean. Modern man still uses these old means of transportation.

Before the time of railroads, a little over a hundred years ago, transportation by waterways was considered so useful that men constructed waterways where there were none. They built inland canals. But the railroads soon proved themselves more rapid and efficient than canals for the handling of freight. Thousands of miles of inland barge canals in the United States were no longer used. There are only two long barge canals now in operation in the United States, the New York State Barge Canal and the Hennepin Canal in Illinois. Even these canals do not save enough money on freight shipments to justify the expense of keeping them operating.

Some rivers, such as the Mississippi and the Ohio, are still used for carrying freight in boats and barges. Ocean-going vessels will always be used to carry freight from one continent to another. It seems certain that waterways will always continue to serve man as highways.

The Water Line of Civilization

Throughout the course of history, civilizations have sprung up and followed the water courses. When the water supply failed, the civilizations went down or even vanished. The valleys of the Tigris and Euphrates rivers once supported a great civilization which largely disap-

peared apparently because the climate changed and the land largely turned to desert. The northern shore of Africa during Roman times supported several spots of civilization. These have now largely disappeared, apparently because of less rainfall. On the other hand, the valley of the Nile has continuously supported a great population since long before written history began. The people of this valley did not depend on rainfall, but on the overflowing of the river and on irrigation. The Nile seldom failed, for its water came from the rain and the snowfalls of the African Mountains.

In modern times men have taken nature in hand to use natural water supplies in such a way as to meet their own needs. More than ever before they are using the waters of rivers and lakes to irrigate farm lands that would otherwise be too dry to raise crops. They dam the larger streams to deepen the channels for boats and to supply hydroelectric power. The Tennessee Valley in the United States has been greatly changed and much improved, largely by careful conservation and use of its water supply. Many large dams on the rivers of the valley supply the means of river transportation and power. Along with this, soil-conservation and industrial-development programs are being carried forward. The results show that by taking thought and directing efforts to make the best use of natural water supplies it is possible to shape the course of human events and not leave the fate of civilizations entirely to a more or less fickle nature.

Water can be made to work for man and greatly enrich his life. Or it may be neglected, misused, allowed to get out of control and become destructive, taking land, buildings, means of livelihood, even human life itself. The water supply is the nation's greatest natural resource. If it is used wisely it will always be an asset and there will be an ample supply not only for this generation but for all generations to come. C.C.F.

Related Subjects. The reader is also referred to:

Air Conditioning	Hydraulics
Artesian Well	Hydrography
Conservation	Hydrophone
Dam	Hydroponics
Erosion	Hydrosphere
Evaporation	Hydrostatics
Floods and Flood Control	Hydrotherapy
	Irrigation

QUALITIES OF WATER



As a liquid, water flows and pours



As a solid, it is hard and brittle



As a vapor, it cannot be felt or seen

Pump
Salt
Transportation (Travel on
Water; illustrations)
Water Clock
Water Meter

Water Power
Waterproofing
Water Softening
Waterworks
Well

FORMS OF WATER

Cloud	Iceberg
Dew	Mineral Water
Fog	Rain
Frost	Sea Water, Purification of
Geyser	Sleet
Glacier	Snow
Ground Water	Spring
Hail	Steam
Haze	Waterfall
Heavy Water	Waterspout
Humidity	Whirlpool
Ice	

WATERWAYS

Canal	Ocean
Lake	River

Outline

I. What Water Is and How It Behaves

- | | |
|--------------------|----------------------------|
| A. Heavy Water | D. Evaporation and Boiling |
| B. Ice | E. Water under Pressure |
| C. Surface Tension | |

II. The Work of Water

- | |
|--|
| A. Water Shapes the Surface of the Earth |
| B. The Solvent Action of Water |

III. Water in Living Cells

IV. The Natural Water Cycle

- | | |
|--------------------------------|---------------------------|
| A. Rainfall | C. Water under the Ground |
| B. Water Currents in the Ocean | |

V. Purifying Water

- | |
|--------------------|
| A. Softening Water |
|--------------------|

VI. Water Power

VII. The Thirsty Plants

VIII. Water in Industry and Transportation

IX. The Water Line of Civilization

Books for Younger Readers

- BAER, MARIAN E. *Wonders of Water*. Farrar, 1938. Water—in the air, on the earth, in food, animals, and the human body—described and explained.
- EDELSTADT, VERA. *Oceans in the Sky*. Knopf, 1946. Story of water told in verse form with effective black and white illustrations.
- PIGMAN, AUGUSTUS PENN. *Story of Water*. Appleton-Century, 1938. Water through the ages, from "Water for the Cave People" to "Water in Modern Times."
- PRYOR, WILLIAM CLAYTON, and H. S. *Water—Wealth or Waste*. Harcourt, 1939. Importance of water and its place in the life of people.
- REED, WILLIAM MAXWELL, and BRONSON, W. S. *Sea for Sam*. Harcourt, 1935. Story of the oceans, their origin, tides, and undersea life, written for beginning scientists.
- ROGERS, FRANCES, and BEARD, A. *Fresh and Briny, the Story of Water as Friend and Foe*. Stokes, 1936. Describes our dependence on water, where water comes from, how to control water, water power, and tides.

Books for Adults

- EHLERS, VICTOR MARCUS, and STEEL, E. W. *Municipal and Rural Sanitation*. 3d ed. McGraw, 1943. Text that may be used by a high-school student.
- HASKINS, CARYL PARKER. *The Amazon; the Life History of a Mighty River*. Doubleday, 1943.
- LILIENTHAL, DAVID ELI. *TVAs; Democracy on the March*. Harper, 1944. How a great water project can increase democracy.

LUDWIG, EML. *The Nile; the Life Story of a River*. Garden City pub. co., 1939.

RYAN, WILLIAM JOHN. *Water Treatment and Purification*. 2d ed. McGraw, 1946. How we must purify the water we use.

STEEL, ERNEST WILLIAM. *Water Supply and Sewage*. McGraw, 1938. Where our water comes from and how we keep it pure.

Questions

- How important is water to human life?
What two gases form when they unite?
What are other forms of "solid" water besides ice?
What happens when water *evaporates*? Does cold or warm water evaporate faster?
Why does water boil?
Why does it take longer to boil an egg on a mountain than it does at sea level?
Why is water called the *universal solvent*?
How much of the human body is water?
What is the longest time a person has been known to live without water?
How much of the earth is covered with water?
Why is absolutely pure water a rare substance?
How is water purified for human use?
What makes water *hard*? How can it be softened?
About how much water does it take for a plant to produce one pound of food? A bushel of corn? How much water does it take altogether to produce a pound of beef?

WATER ADDER, another name for the water moccasin. See WATER MOCCASIN.

WATER ANIMAL. See BARNACLE; CETACEAN; CORAL; CRUSTACEAN; FISH; MOLLUSK; SPONGE.

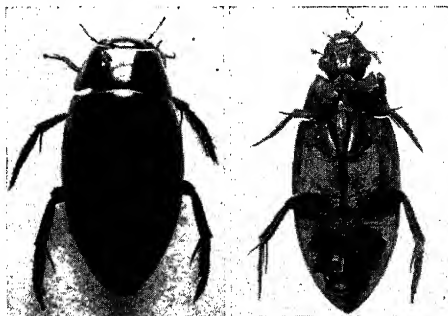
WATER ARUM. See ARUM (Classification).

WATER BAROMETER. See BAROMETER.

WATER BEECH. See IRONWOOD.

WATER BEETLE. This name refers to four separate families of beetles which live in the water. Typical water beetles are the *whirligigs*, the *diving beetles*, the *crawling water beetles*, and the *water scavenger beetles*. Some of these insects live in the water for their entire lives. Others live in or near the water only in the larval, or young, state.

Whirligigs whirl on the top of the water. They have short feelers or antennae, long clawed front legs, paddle-shaped hind legs, and compound eyes. These eyes are divided into two pairs. The lower pair seems to be suited for seeing in the water. The upper pair is suited for seeing in the air. Diving beetles have long, threadlike antennae. Their hind legs are flat and fringed, and used for swim-



Cornelia Clarke

The Water Scavenger Beetle has swimming legs fringed with bristles. It is shown from above (left) and below.

ming. Common water beetles have short, club-shaped antennae. They are like the diving beetle in their habit of eating small fish and larvae of insects. All water beetles are well suited to life in aquariums. Their habits make an interesting study. G.P.

Classification. Water beetles belong to the order *Coleoptera*. The crawling water beetles belong to the family *Halplidae*; the diving beetles to *Dytiscidae*; the whirligig beetles to *Cyprinidae*; and the water scavengers to *Hydrophilidae*.

WATER BIRD. See BIRD (color plates, American Water Birds; Wild Ducks); also, under *Related Subjects* at the end of the article, the list of Oceanic Birds.

WATER BOA. See ANACONDA.

WATER BOATMAN. See WATER BUG.

WATERBUCK. See ANTELOPE (Kinds).

WATER BUFFALO. Several kinds of wild oxen are called water buffaloes. Some have been domesticated, and are among the most useful of all farm animals. The black water buffalo of India is one of the largest of wild cattle. The bulls are often five to six or even six and a half feet tall, and their horns may spread twelve feet from tip to tip, measured along the curve. The horns sweep out and back to form nearly a circle. The horns are three-sided. The Indian buffalo's hide is bluish black, and is easy to see through its thin hair.

Water buffaloes like to wallow in the mud and water a large part of the day. They are very fierce when wild, and a water buffalo is said to be a match for a large lion or tiger. The Indian buffalo has long been used in the rice fields of Asia, and makes rice farming possible on a large scale. This powerful animal can plow knee deep in mud. It has been imported to many other parts of the world—Egypt, Spain, Italy, Hungary, and southern Soviet regions, southern Asia, the East Indies, and the Philippines.

Buffalo hide is tough and thick, and makes good leather. The milk of the cow is nourishing, with more fat than the milk of domestic cows. It is used in India for making a liquid butter.

The *carabao* is a smaller water buffalo of the Philippines. It is also important in farming. A native wild buffalo on Mindoro Island is called the *tamarau*. Africa is the home of two species of wild buffaloes, the big Cape

buffalo, which has flattened horns, and the smaller Congo buffalo of western Africa. V.H.C.

See also ANIMAL (color plate, India, South Asia, and East Indies); BUFFALO; CARABAO.

Classification. Buffaloes belong to the subfamily *Bovinae* of the cattle family, *Bovidae*. The Indian water buffalo is *Bubalus bubalis*; the Cape buffalo is *Syncerus caffer*; and the Congo buffalo is *S. nanus*.

WATER BUG is the general name given to insects which spend all or part of their lives in the water. The most familiar of the water bugs are the *water boatmen*, the *back swimmers*, the *giant water bugs*, and the *water striders*. No one knows the complete life history of any of these insects.

Both water boatmen and back swimmers have long, flattened, fringed hind legs. These legs serve as oars and cause the insects to move through the water. Water boatmen eat algae and bottom scum, and back swimmers eat smaller animals which live in the water. These insects come to the surface for air from time to time. During the winter they lie sleeping in the mud at the bottom of the water. The water boatmen lay their eggs and attach them to the stems of plants. Back swimmers lay their eggs within the stems of these plants. Back swimmers receive their name because of their peculiar habit of swimming through the water while lying on their backs.

The giant bug that is often seen flying around electric lights in hot weather, casting its great shadows on the ground, is a water bug. This bug leaves its home in the water for short periods in the air. It is looking for a mate or for a new pool in which to live.

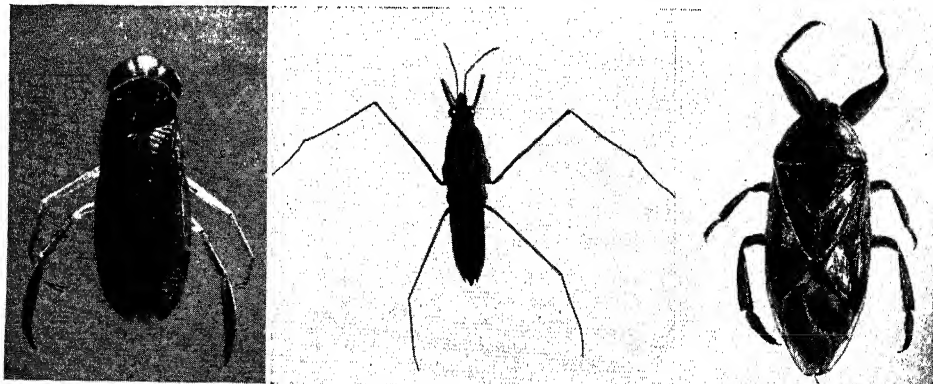
Water striders have long spiderlike legs. They do not swim through the water but stride about on the surface film. Many water bugs can cause painful stings, and it is wise to avoid them.

See also Bug.

G.P.

Classification. Water bugs belong to the order *Hemiptera*. The water boatmen belong to the family *Corixidae*, the back swimmers to the family *Notonectidae*, the giant water bugs to the family *Belostomatidae*, and the water striders to the family *Gerridae*.

WATERBURY, Conn. (population 99,314). Waterbury is widely known as "The Brass City." It ranks first among the cities of the United States in the manufacture of brass and copper goods, sheet and rolled brass, brass



Cornelia Clarke; Ralph Buchsbaum

These Water Bugs Are the Water Boatman (Left); the Water Strider (Middle), and the Giant Water Bug (Right)

casting, and other brassware products. Waterbury is situated on the Naugatuck River about thirty miles north of Long Island Sound in the hilly uplands of western Connecticut. Besides brass, the manufactures of Waterbury include watches, clocks, buttons, files, recording instruments, needles and pins, plated and britannia ware, knitted goods, and foundry and machine-shop products.

The land on which Waterbury stands was purchased from the Indians in 1674, and a frontier outpost called Mattatuck was established on it. The name was changed to Waterbury when the town was incorporated in 1686. The manufacture of brass goods began in 1802 with the making of brass buttons. Waterbury became a city in 1837.

G.E.F.

WATER CARRIER. See *ASIA* (color plate, Water Carriers in Shanghai).

WATER CHINQUAPIN. See *LOTUS*. **5379**

WATER CLOCK, or *CLEPSYDRA*, *KLEP sih drah*, is an instrument for measuring time by means of water escaping from a vessel. Its invention is generally accredited to Plato about 400 B.C. It was used long before modern clocks were invented. It was usually in the form of a glass jar, with a scale of marking on its side. These were so arranged that, as the water ran out, the water left in the jar marked the time. Various improvements were made in the device, such as having a floating figure point to the hour, or causing the dripping water to turn a small wheel which was connected with the hands on the face of a dial. The water clock was used in Rome as early as 159 B.C. It was used in Athens to regulate the length of speeches in the law courts.

R.E.Go.

WATER COLOR. The use of water colors is one of the most popular forms of painting. The method has some drawbacks for the artist. The paints dry so quickly that correction or alteration is difficult. The soft, pastel tones of water colors make it hard to paint rich, deep coloring. As a result, water-color paintings are usually dry and delicate, and are suited to sketchy effects. Water-color paints are most suitable when the artist wants to put much light into his picture. He can do this by allowing the white paper to show through.

Water-color paints are difficult to use well, but they are often given to young children because they are cheap and because they can help train the child in handling paints and brushes. Many art teachers recommend that children be given crayons, chalk, and tempera to use before water colors.

Water-color paints are made from pigments, or coloring matter, which are ground to a powder and mixed with water and gum size, or other binding material. Water colors are usually made in the form of small cakes. A damp brush is rubbed lightly over the cake and then applied to the paper.

Many great artists have found water colors a challenge to their ability, and some of the world's finest paintings are water colors. They were known in ancient times, but wide modern use of them began in England in the 1800's.

T.M.

WATERCRESS. See *CRESS*.

WATER DOG is a kind of American salamander sometimes called *Mud Puppy*. The term is also used for dogs, such as spaniels, that are good swimmers and are used

to retrieve waterfowl in hunting. See also *MUD PUPPY*.

WATER DUST. See *RAIN* (How Rain Falls).

WATERED STOCK. See *STOCK*, *CAPITAL*.

WATERFALL. Any sudden descent of a stream from a higher to a lower level is a waterfall. In wearing down its channel, a river uncovers certain layers of rock that are softer than others. If the hard rock is farther upstream than the soft, the channel below is worn more rapidly, and a waterfall results. Sometimes the hard ledge forms the edge of a vertical cliff, over which the water plunges. If the volume of water is small, the fall may be called a *cascade*. If the volume of water is large, a fall of this sort is called a *cataract*. Niagara Falls is such a cataract. Other noted cataracts are Victoria Falls on the Zambesi River in Africa, the Falls of the Iguaçu on the Paraná River in South America, and the Grand Falls of the Hamilton River in Labrador. Usually, however, the term *cataract* is applied to a series of rapids or falls caused by the flow of the stream over a rapidly sloping rocky bed. Examples of these are the cataracts of the Nile and the Orinoco rivers. A cataract which has a small, gradual fall is termed a *rapids*. Some of the most noted rapids in North America are those at Sault Sainte Marie, at the outlet of Lake Superior, and the rapids in the Saint Lawrence River.

Small waterfalls or cascades are often of great height. Such are the Upper Yosemite Falls in California, 1,430 feet high; the Sutherland, New Zealand, 1,904 feet; and the Staubbach of the Alps, 980 feet. Some waterfalls are not so high, but are noted for their beauty. These include Montmorency Falls, near Quebec; Multnomah Falls, on the Columbia River, Oregon; numerous cascades in the Rocky and Selkirk mountains; and the Upper and Lower falls in Yellowstone National Park.

Falls usually occur in mountainous countries. But sometimes they are caused by the descent of streams to a flood plain. The line along which several rivers flowing into the same body of water descend to this lower level is called the *fall line*. The fall line of those rivers south of Chesapeake Bay which flow into the Atlantic Ocean is marked by the location of manufacturing cities whose sites were chosen because they were near water power, which later became even more valuable as hydroelectric power. Examples of these industrial centers are Richmond, Va., Raleigh, N.C., Augusta and Columbus, Ga., and Columbia, S.C.

A picture chart of important waterfalls of the world, showing their location and height, will be found on the two pages immediately following this article. L.D., Jr.

Related Subjects. The reader is also referred to:

Angel Falls	Niagara Falls, and
Fairy Falls	Niagara River
Fall Line	Paraná River
Gersoppa, Falls of	Reversing Falls of St. John
Giessbach	Ribbon Falls
Grand Falls of the	Roraima Falls
Hamilton River	Stanley Falls
Kaïeteur Falls	Staubbach
King Edward VIII	Sutherland Falls
Falls	Tugela Falls
Kukenaam Falls	United States of America
Minnehaha Falls	(color plates)
Multnomah Falls	Victoria Falls

2,000 ft.

WATERFALLS OF NORTH AMERICA

1,500

1,000

500

Niagara
New York
167 feet

Yellowstone,
Lower
Wyoming
308 feet

Vernal
California
317 feet

Yosemite,
Lower
California
320 feet

Hillilouette
California
370 feet

Nevada
California
f.

Bridal Veil
California
620 feet

2,000 ft.

OTHER WATERFALLS OF THE WORLD

1,500

1,000

500

Victoria Falls
Africa
343 feet

Gersoppa
India
830 feet

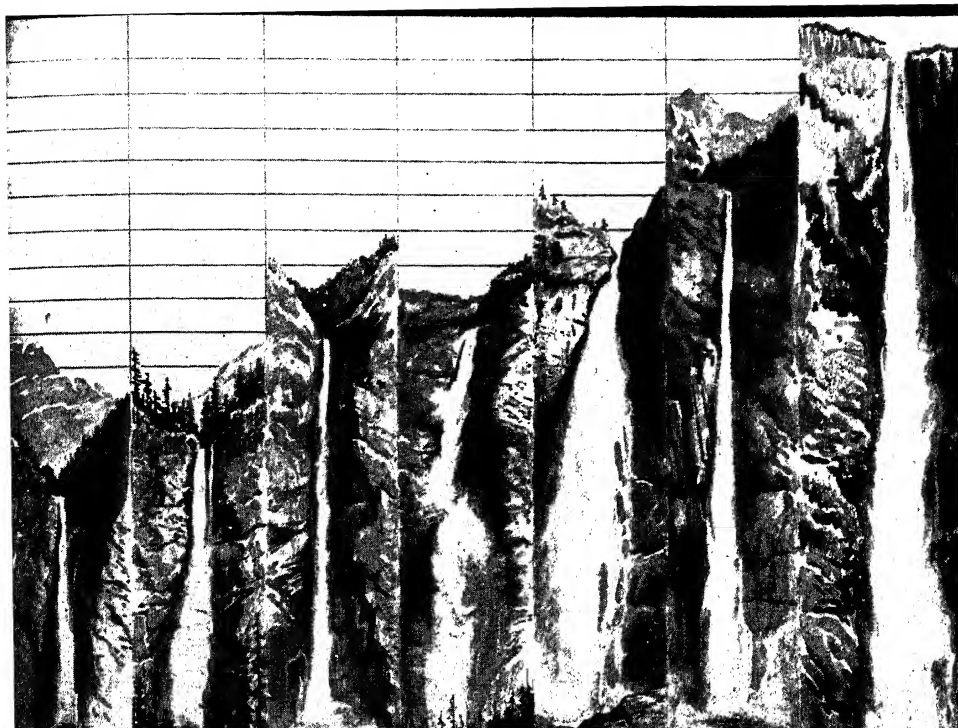
King Edward
VIII
British Guiana

Vettisfos
Norway
850 feet

Staubbach
Switzerland
980 feet

Trümmelbach
Switzerland
980 feet

Giessbach
Switzerland
980 feet



Fairy
Washington
700 feet

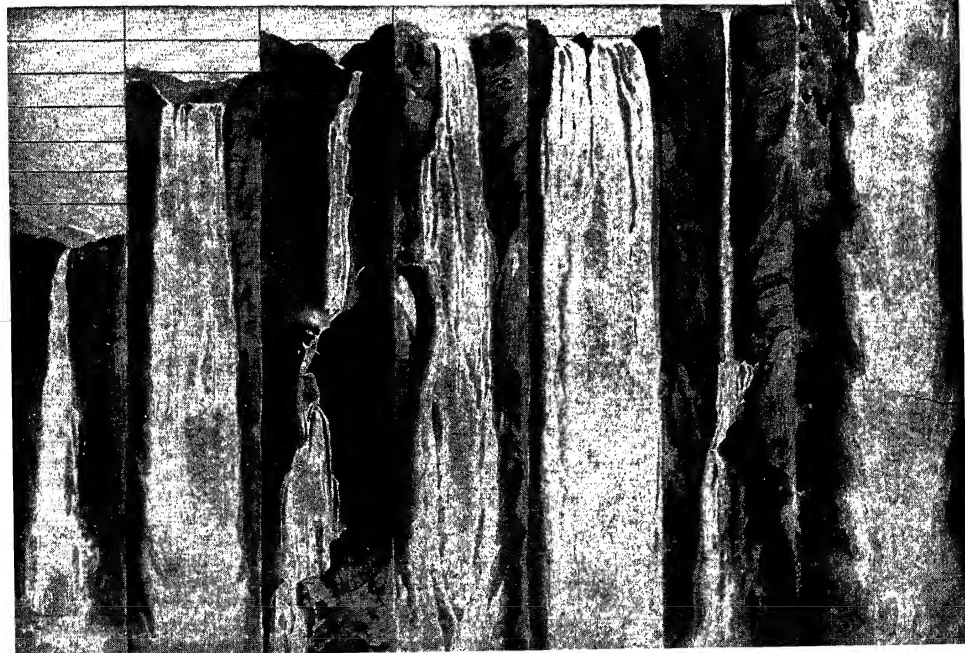
Multnomah
Oregon
850 feet

Widow Tears
California
1,170 feet

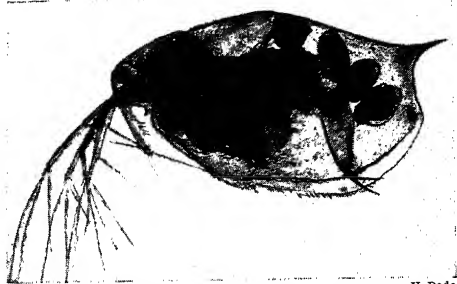
Takkakaw
British Columbia
1,200 feet

Yosemite,
Upper
California
1,430 feet

Ribbon
California
1,612 feet



WATER FLEA, or **DAPHNIA**, *DAF nih ah*. This creature is not an insect, but a tiny fresh-water shellfish, about $\frac{1}{16}$ inch long. It skips and jumps through the water like a flea, using its feelers as oars. These feelers are the *antennae*. The water flea has a hinged shell of transparent chitin. Because the action of the heart and other



The Water Flea's Transparent Body Aids Science

organs can be seen through its transparent body, the water flea is often used in scientific experiments on the effects of drugs. The head narrows into a long snout. On the head are also feelers, and a single compound eye in the middle. This eye is really formed from two side eyes which have grown together. The animal also has five pairs of leg parts, called *appendages*. They move continually, and their motion helps the animal breathe. They also sweep in food and water. In the summer, millions of the creatures swarm in ponds and marshes, and their bodies color the water. G.P.

Classification. Water fleas belong to the class *Crustacea*. They form the genus *Daphnia* of the order *Cladocera*. There are several hundred species.

WATERFORD. See **EIRE** (Cities).

WATER FORMS. See **WATER** (list of Related Subjects at the end of the article).

WATER GAP. See **APPALACHIAN MOUNTAINS**.

WATER GAP, DELAWARE. See **DELAWARE WATER GAP**.

WATER GAS. See **STEAM**.

WATER GAUGE. See **GAUGE**.

WATER GLASS, or **SOLUBLE GLASS** (chemical formula, Na_2SiO_3) is a jellylike compound of sodium, silicon, and oxygen. Its chemical name is sodium metasilicate. Pure water glass is colorless, and readily dissolves in water. This solution is used to preserve eggs. It makes the shells airtight by filling their pores. The solution is also used in soaps, in preserving wood, and in fireproofing wood, cloth, and paper. Water glass will also waterproof walls. Its chief use in industry is as an adhesive in manufacturing fiberboard shipping cases and similar containers. G.L.Bu.

WATER HEMISPHERE. See **HEMISPHERE**.

WATER HEN. See **GALLINULE**.

WATER HYACINTH is a plant of tropical America and Florida. It grows in ponds and streams, and sometimes chokes them with its growth of floating leaves. The flowers are large and showy. They are colored violet, with a blue and yellow spot on the top lobe. One variety has rose-colored blossoms. The water hyacinth can be grown in tanks in a foot of water with good soil on the

bottom. The plants are propagated by division. See also **FLOWER** (color plate, Flowers of Lake, Stream, and Swamp).

Classification. Water hyacinth is known as *Eichhornia crassipes* and classed in the family *Pontederiaceae*. The rose-colored variety is var. *major*.

WATER LILY, or **POND LILY**, is the popular name for various beautiful water plants that grow in both temperate and hot climates. The American water lily is related to the lotus. These plants send their long, stout leaf and flower stalks up from the mud bottom of clear, shallow water. Their narrow to round green leaves grow submerged or are seen floating on the surface of the water. The flowers are usually raised above the water on long flower stalks. The white-flowered water lily is the most common, but there are also water lilies that have pink, red, and yellow flowers. The flowers may be as large as a foot across. The leaves are from two inches to over a foot across. Some water lilies bloom during the day and others during the night. Each kind, however, opens and closes its flowers day or night. The water lily is the flower for the month of July. See also **FLOWER** (color plate, Flowers of Lake, Stream, and Swamp). T.J.

Classification. Water lilies belong to the family *Nymphaeaceae*. The native white water lily of the eastern United States is called *Nymphaea odorata*. *N. flava* is a yellow species, native along the Gulf Coast from Florida to Texas.

WATERLOO, Ia. (population 51,743). This meat-packing and farm-machinery manufacturing center in northeastern Iowa lies on the Cedar River about ninety miles northeast of Des Moines. Some of the best livestock in the world is exhibited annually in the fall at the Dairy Cattle Congress in Waterloo. The first settlers, who arrived in 1845, called the place *Prairie Rapids* but the name was changed to Waterloo in 1851 when they applied for a post office. The community was incorporated as a city in 1868. Waterloo is the seat of government of Black Hawk County. J.E.Br.

WATERLOO, BATTLE OF. The French military genius, Napoleon Bonaparte, met his final defeat at the bloody battle of Waterloo. The battle was fought on June 18, 1815, near the Belgian village of Waterloo. The field of battle lay about ten miles southeast of Brussels. The defeat put an end to Napoleon's ambitions and forced him to withdraw from European affairs. It led to his being banished to the small, rocky island of Saint Helena.

At the battle of Waterloo, Napoleon's French troops fought against British, German, Belgian, and Prussian forces. The British commander, the Duke of Wellington, set the scene for the mighty struggle. He established his forces on a high plain just south of Waterloo. On June 17, Napoleon's army took up a position on the hills opposite Wellington's troops. A large Prussian army was on its way to join Wellington's army. Napoleon knew that the two armies would soon join forces. He decided to destroy Wellington's forces before the Prussians could arrive to help the British commander.

On June 18 the French started a terrific attack. But the British lines held firm, and the French were forced to retreat. By nightfall, both armies were exhausted. Then General Gebhard von Blücher arrived with his

army of Prussians. Wellington's soldiers were encouraged. The combined British and Prussian armies finally turned the battle against the French.

Napoleon made one last effort to win the battle. He flung his best troops, the famous "Old Guard," against the enemy's position. Three battalions of the Guard advanced and fought bravely, but were finally over-



Joseph Boggs Beale, Modern Enterprises

The "Old Guard" at the Battle of Waterloo made a brave stand against overwhelming odds. Even in Napoleon's great defeat the war-hardened, veteran French soldiers lived up to the motto: "The Old Guard dies, but never surrenders!"

whelmed. Wellington's army then came forward in a fierce bayonet charge, and the French fled in a hopeless retreat.

Both sides had many men killed and wounded. The French lost about 40,000, and Great Britain and its allies about 23,000. The fighting was so violent that nearly 45,000 fallen soldiers lay within an area of three square miles.

The battle of Waterloo crushed the power of Napoleon forever. The decisive defeat gave rise to a popular expression. When a person suffers a complete defeat of plans, arrangements, or ambitions, we say he has *met his Waterloo*.

The historic battle of Waterloo has been recorded in many works of literature. Lord George Byron dedicated one of his poems to the conflict. Victor Hugo wrote about the battle of Waterloo in his novel, *Les Misérables*. *Vanity Fair*, by William Makepeace Thackeray, also tells of the battle of Waterloo. J.S.S.

See also BLÜCHER, GEBHARD VON; NAPOLEON I; WELLINGTON, DUKE OF.

WATERMARK. See PAPER (Special Kinds of Paper).

WATERMELON. This vining plant produces very large fruits which contain delicious red pulp. The plant is related to the pumpkin, squash, muskmelon, and cucumber. The watermelon first grew in Africa, and spread to southern Asia in early times. The fruit is now raised in America, where the best varieties were developed.

The vines may branch out twelve to fifteen feet in all directions. The few fruits they produce are quite large. The average watermelon weighs between twenty and

thirty-five pounds, and often the fruit grows to forty, fifty, or even sixty pounds.

The watermelon has a hard outer shell, or rind, which is completely filled with pulp. This pulp turns red as the fruit ripens. The seeds are found in the pulp, and may be white, brown, or black. The fruits may be round, oblong, or oval in shape. The color of the fruits varies from plain dark green to mottled and striped green, or almost white.

The watermelon is a warm-season crop, and is grown chiefly in the southern part of the United States. The seeds should not be planted until the heat of summer has come. The fruits ripen in eighty to ninety days, depending on the variety.

Watermelons grow best in deep sandy soils which can hold moisture well. The vine blooms richly, but only a few of the blooms produce melons. The yield per acre is not great. The vines are so long that the fruit must be planted in hills eight or even ten feet apart. The small city garden is not well suited for this plant. The fruits must not be harvested until they are fully ripe, or they will lack flavor.

The production of watermelons for sale is centered in Georgia, Florida, Texas, South Carolina, and Alabama. The fruit is 93 per cent water, and has low energy value. It is eaten with great enjoyment, however, because of its sweet, fresh, delicious taste.

The watermelon is attacked by the same insects which damage cucumbers. It is also attacked by a very serious disease called *anthracnose*. This disease may be held in check, though not controlled, by spraying with Bordeaux mixture. L.A.S.O.

See also FARMING AND FARM LIFE (color plate, Enjoying a Watermelon).

Classification. Watermelons belong to the family of cucurbits, or *Cucurbitaceae*. Their scientific name is *Citrullus vulgaris*.

WATER METER is an instrument which measures and records the amount of water that is used in a given place. Water meters are used in homes, factories, busi-



J. Horace McFarland

The Dixie Queen Watermelon has a thin, striped skin and an exceptionally sweet flavor.

ness houses, and in public establishments. They measure the flow of water along the water pipe from the mains to the individual users. There are several types of water meters. The most commonly used type of meter is known as the *positive* meter. This meter measures the entire amount of water that is used. Another meter, known as the *proportional* meter, measures only a definite part of the entire amount of water used; for example, $\frac{1}{10}$, and the entire amount used is found by multiplying the meter reading by the proper factor, in this case by 10. Still a third meter is the *inferential* meter, which measures the velocity, or rate of flow, of water.

The positive meter consists of a chamber into which the water is directed through a pipe. This chamber is divided into two equal compartments by a hard rubber disk. As the water rushes in, it causes the disk to turn or rotate. This means that one compartment is always filling up with water while the other compartment is always emptying its water. The rotating disk is connected with a series of gears which move the pointers on the recording dial. The recording dial registers the amount of water that passes through the water meter. The water is usually measured in cubic feet.

Another type of positive water meter consists of pistons which move in an upward and downward direction. The movements of the pistons are transmitted to the pointer on the recording dial through a gear wheel.

Water meters are usually installed by public utility companies to determine how much to charge for the use of water. The meters are usually read every month and the charges are made by subtracting the previous month's reading from the current reading. E.A.Fe.

WATER MOCCASIN. The water moccasin is a very poisonous snake that lives in the southeastern United States. It is also called *moccasin snake* and *cottonmouth*. All water moccasins live in the area south of a line running from Cape Charles, Va., to the middle of the Alabama-Georgia boundary, then to southern Illinois, and from there to the point where the Pecos River and the Rio Grande meet in Texas. No water snake north of this area is dangerous, and none is a moccasin.

The water moccasin is a pit viper, like the rattlesnake. It has a hollow, or pit, in the side of its head, in front of the eye and below its level. Several harmless water snakes have a broad head like the moccasin, but they all lack the pit which helps to distinguish them.



The Deadly Water Moccasin is one of the few poisonous snakes in North America. The moccasin, also called the cottonmouth, lives in southern swamps and bayous.

New York Zoological Society

The water moccasin is usually about $3\frac{1}{2}$ feet long, although the largest ones may grow to 5 feet. The body has broad dark-olive bands across it. This is the same as the pattern of various harmless snakes.

This snake feeds on frogs, fishes, and other small backboned animals that live in the water or near it. The young snakes are born alive.

The moccasins like to stay in watery places, on the wooded banks of rivers, in large streams, and on lake shores. This habit makes it easier for people to avoid the water moccasin than to avoid the rattlesnake and copperhead. The bite of the water moccasin is highly dangerous, and may be fatal.

This snake is called a cottonmouth because it is supposed to have a whiter mouth than other snakes, but the difference in appearance is not great. No harmless snake is called a cottonmouth. C.H.Po.

Classification. The water moccasin belongs to the family *Crotalidae*. Its scientific name is *Agkistrodon piscivorus*.

WATER ON THE KNEE. See KNEECAP.

WATER OPOSSUM. See ANIMAL (color plate, Central and South America).

WATER OUZEL, OO 2'l, is a small thrushlike bird of western North America which dives and dips under water. It is also called the **DIPPER**. It lives in mountain regions and is a very active little bird, fearlessly diving into mountain streams for water insects. The water ouzel will even dash through waterfalls to build its nest of moss in a sheltered crack of rock underneath the falls.



Water Ouzel, or Dipper

The bird has slate gray feathers on its back and is a little lighter on the breast. Its wings and tail are short, and it carries its tail upward, like a wren. The female lays from three to five white eggs.

Close relatives of the American dipper are found in Mexico, Central America, South America, and the Old World.

Classification. Dippers make up the family *Cinclididae*. The American dipper is *Cinclus mexicanus unicolor*.

WATER PIG. See CAPYBARA.

WATER PLANT, or AQUATIC, ah KWAT ic, PLANT is the name which refers to any special group of plants that live wholly or partly in water. The term *aquatic* as ordinarily used refers to such higher, more complex plants as grow in water, and does not include the algae, which are much simpler in structure.

Aquatic seed plants may be rooted in the mud and have their leaves and blossoms above the surface of the water, or they may be wholly beneath the surface of the water. Submerged water plants are frequently equipped with air bladders, or have large air pores in their stems and leaves. Some of the best-known water plants are the beautiful water lily, which is common on lakes and ponds; water cress, which spreads so rapidly that it sometimes blocks the channels of streams; and the cat-tail or bulrush, which children sometimes soak in oil,

WATER POLO

light, and use as a torch in the nighttime. W.C.BEA.

Related Subjects. The following water plants are given specific treatment in these volumes:

Bladderwort	Papyrus
Bulrush	Pondweed
Cattail	Rush
Cress	Seaweed (with list)
Duckweed	Water Hyacinth
Lotus	Water Lily

WATER POLO. See POLO.

WATER POWER. Water power is the only source of energy which man uses that does not eventually become used up. When we burn coal or gasoline, we are using something that we cannot replace. Even when the great energy in the nucleus of the atom is liberated, we are destroying the atom which provided the energy. But water power is provided by the constant operations of nature. As long as water is evaporated from the ocean into the air, forms into clouds, and falls as rain or snow on mountaintops, the supply of water power will be available for our use.

Water power comes from various devices which man has built in order to permit him to use the energy found in water as it moves from higher to lower places on the surface of the earth. In using water power man is harnessing the effects of gravity upon the water. The energy in water power comes both from the weight of the water and from the head upon it. The head of the water is measured by the vertical distance through which the water falls in performing work. The pull of gravity gives a weight of 62.4 pounds to every cubic foot of water. Therefore, a column of water one foot square at the base and thirty feet high would exert a weight of 1,872 pounds. When this weight strikes the wheel of a machine, it turns the wheel and thus develops energy which can be useful. It is only necessary to bring the wheel into contact with the source of energy.

Measuring Water Power. Water power is usually measured by the horsepower unit. One horsepower is a force that will raise 33,000 pounds one foot in one minute, or 550 pounds one foot in one second. To estimate the horsepower of a waterfall, multiply the flow in cubic feet per second by the height of the fall in feet. Then multiply this product by .113 — which is equal to 62.4, the weight of a cubic foot of water, divided by 550. According to this rule, the power that exists in a waterfall fifty feet high with a flow of 500 cubic feet per second would be $50 \times 500 \times .113$, or 2,825 horsepower. When we speak of the potential power of a river, we usually mean the power that the ordinary minimum flow of the stream (95 per cent of the time) exerts on a machine that is 100 per cent efficient. The potential water power of the entire world has been estimated at 672,000,000 horsepower. But, the United States Geological Survey says that if man could learn to store all the rain waters that fall upon the earth and develop and transmit that power with 100 per cent efficiency, the total horsepower in the world might be five to ten billion horsepower.

Mechanical Power from Water. The use of water power is hundreds of years old. The first devices were fairly simple. Man built a wall or a platform by the side of a stream and attached a wheel which the water pushed against. When the water struck the blade of the



Bureau of Reclamation
Water Power from This Huge Dam turns great generators that provide electricity for industry, farms, and homes.

wheel, it turned, and power from the wheel could be used to run simple machinery. At first this power was used for lifting water from a river or for grinding wheat between heavy stones which were turned by the wheel. Even after man learned how to use other sources of power, such as the wind to run his windmills and the power in coal to run steam engines, he continued to use the power of water wherever it was possible. Water power was dependable, safe, controllable, and cheap.

Man soon learned to improve his ways of using water power. He built dams which caught the floodwaters and stored them. Then the water could be let out only when needed and the stream could be used during dry seasons. Dams also raised the water to a higher level. In this way, the head of the water was increased. Canals and wooden troughs called *flumes* were built to carry water to suitable parts of the machinery. There was much inefficiency in some of these early machines which depended upon water power. Power was lost because of the friction in various channels which were used to carry the water. The clumsy wheels could not carry all the power available to the places it was needed.

The original floating wheel was given up for the undershot and overshot wheels. These were both widely used until the hydraulic turbine was invented about 1850.

The streams also supplied power for another purpose. Often lumber was floated down in big rafts from the forest to the saw mill. In other cases, the water power served to float the finished product down the river to a port.

During the early 1800's, the direct use of water power became highly developed. Almost every stream in New England had its paper or cotton mill. Water from the Piedmont Plateau ran down the Susquehanna, the Potomac, the James, the Yadkin, the Tombigbee, the Santee, and the Cooper rivers into the Atlantic Ocean,

turning the wheels of mills and factories as it ran. The power from this water was used in making furniture, stoves, shoes, stockings, plows, axe handles, cotton cloth, and woolen blankets — all goods that were desperately needed by the growing United States. Water power was particularly important along the Atlantic Coast, because there a steady and plentiful rainfall of forty to sixty inches a year ran down the steep hills toward the sea. The seasons were seldom so dry that there was no water to turn the wheels. But the machinery used was simple and could make use of only about fifteen to twenty feet of the fall of the stream.

Water Power as a Source of Electric Power. The next great step in the use of water power came with the invention of the hydraulic turbine about 1850. This permitted much greater efficiency in the use of water power. It made it possible for the first electric generator to be put to work in September, 1882, at Appleton, Wis. Generators now produce electric power to run our machinery, light our homes and our streets, and perform a thousand other tasks.

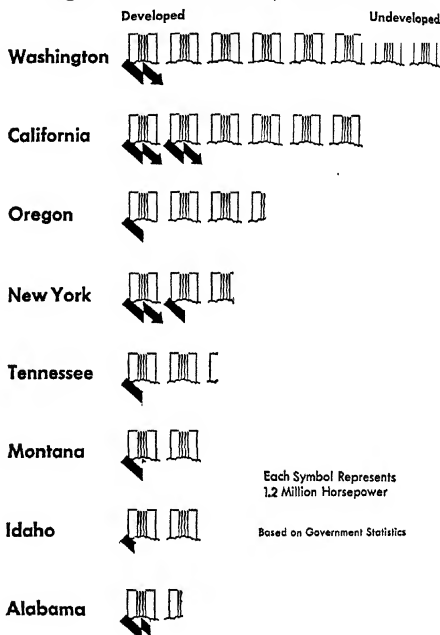
The use of hydroelectric machinery, which changes the energy of water power into electrical energy, allows man to make the best possible use of the potential water power in the world. In 1942 it was estimated that about 75,000,000 horsepower was being usefully developed from the waters of the world. During World War II it is probable that more power was added to this total than was lost. The future development for obtaining electricity from water power is tremendous. One great project, for example, is to dam the Yangtze River in China and develop 14,000,000 horsepower. There is 10,000,000 potential horsepower in the Saint Lawrence River and only one quarter of this amount is being used. It is still true that about two thirds of the total power of the world is produced by burning coal and other fuels. But the use of hydroelectric power is steadily increasing. New ways have been developed of obtaining power from the water by means of more efficient turbines, and also of transmitting the electricity once it is obtained. Now it is possible to build a hydroelectric plant on an isolated mountain, where the rainfall is plentiful and the rivers slope down rapidly. This power can be carried by hundreds of miles of electric wire to the far-off cities and the plains. In 1899 the line of Portland, Ore., which carried 4,000 volts, was considered remarkable. Today, the line from Boulder Dam to Los Angeles carries 287,500 volts of power a distance of 266 miles.

The importance of water power as a source of electricity cannot be overestimated. The growth in the use of electricity derived from water is one of the basic ways by which we can judge a civilization. The most highly developed nations have the most hydroelectric power and the most laborsaving devices for their people. After the Russian revolution of 1917, one of the major problems of the Soviet Union was to develop hydroelectric power. The Yangtze project is expected to raise the living standards of the Chinese people. A convenient source of hydroelectric power has made smaller nations, such as Sweden and Switzerland, achieve a higher standard of living than their size and economic resources would otherwise permit. Without such electric power, modern transportation, communication, agriculture, mining,

manufacturing, housing, living comforts, health safeguards, and recreation would not be possible. Furthermore, the newest source of power — that which was found by liberating the energy in the nucleus of the atom — at present depends upon great quantities of electric power to produce it.

Control of Water Power. In the United States there are two basic ways in which the sources of hydroelectric power are controlled. One is by private companies and the other is through large projects managed by public bodies. Even the private companies that operate from navigable streams whose power distribution is interstate are under control of the Federal Power Commission, created in 1920. Much of the electricity generated

Eight Leading Water Power States



PICTOGRAPH CORPORATION

from water power in the United States is produced by large privately owned corporations. But many of the valuable hydroelectric plants are on land which belongs to the Federal government. In many cases the production and distribution of the power is under the direction of the Department of the Interior. Other governmental activities are also involved in the production of electric power from water power. For example, when the Federal Reclamation Service builds dams to irrigate various areas, these dams may also be used for the production of electric power. The Bonneville and Grand Coulee dams on the Columbia River, which will finally produce a maximum of 3,000,000 horsepower between them, are examples of this type of dam construction.

One way in which all the possibilities of the use of water power are considered in planning the overall needs of an area may be seen in the various "Authori-

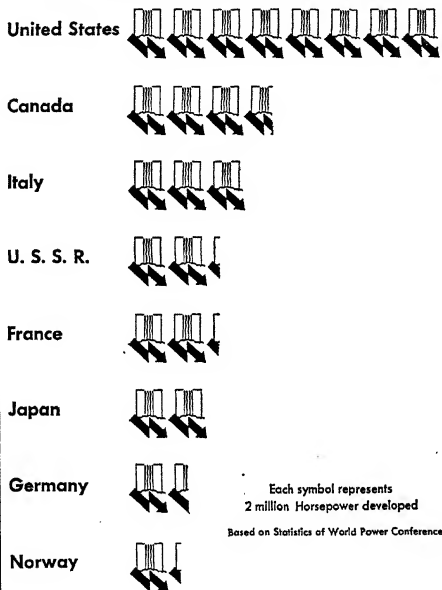
ties." These Authorities have been organized to develop the water-power resources of a river in all the ways in which it can serve the best interests of the people surrounding the river. The Tennessee Valley Authority with its nine power-producing plants is an outstanding example of such overall planning and development. The TVA has greatly improved the living standards of the people in the area which it serves.

Other notable examples of hydroelectric power production by public bodies are the Central Valley of California (Shasta Dam), the Colorado River development (Boulder and Parker Dams), the Santee-Cooper development of South Carolina, and the Columbia River projects (Bonneville and Grand Coulee). The Fort Peck

in Ontario, the Kanawha River in Virginia, and the Catawba in the Carolinas.

World Power Production. The figures in the following table for the potential and developed water powers of the world are mostly estimates which are based on widely varying figures given out in various countries. Furthermore, progress in developing water power is extremely rapid. The building of great projects changes the developed figure year by year. This table represents the figures as of 1942. It is interesting to notice that the continent of Africa with its heavy rainfall and high interior plateau, which drops abruptly to the sea, contains more potential water power than any other continent, and it also has the smallest development of its water power. The Congo River basin alone has one fourth of the world's possible water power. At Stanley Falls 15,000,000 horsepower could be developed. On the other hand, North America contains less than 15 per cent of the world's potential water power, but it has developed over 40 per cent of the used power, 28 per cent of that in the United States alone. Asia is second in potential water power because of the vast drainage areas of her rivers and her high mountains. However, the irregularity of rainfall in Asia seriously affects its ability to produce water power consistently. The potential water power of the world is four times the total of all the power from every other source, including water and coal, used in the world today. Only about 10 per cent of the total water power has been developed. H.HOLW.

Eight Leading Water Power Nations



Dam on the Missouri River, the Nebraska Power Districts, the Norfork Dam in Arkansas, the Denison Dam in Texas, the Pensacola Dam in Oklahoma, and the development of the Snohomish and Skagit rivers in Washington by the cities of Tacoma and Seattle are also public-controlled. International control between the United States and Canada is exerted over the development of power at Niagara Falls, which is perhaps the finest water-power site in North America. Only 1,500,000 horsepower of the potential 6,000,000 horsepower of this site has been used.

Private companies have made many developments in the United States. These include power plants on the Susquehanna River in Pennsylvania, the Coosa in Alabama, the Ôsage in Missouri, the Lewis in Oregon, the Mokelumne, San Joaquin, and Big Creek rivers in California, the Saguenay in Quebec, the Beauharnais

THE WORLD'S WATER POWER

REGION	TOTAL POTENTIAL HORSEPOWER	TOTAL HORSEPOWER USED
Africa	274,000,000	210,000
Asia	151,000,000	8,670,000
China	22,000,000	4,000
Japan	7,000,000	6,000,000
Siberia	64,000,000	?
India	39,000,000	600,000
North America	77,000,000	29,610,000
United States	33,500,000	20,000,000
Canada	25,500,000	8,845,000
Mexico and Central America	18,000,000	1,000,000
Europe	74,000,000	30,140,000
Germany	3,500,000	all
Soviet Union (no exact figures available)		
Norway	16,000,000	3,308,000
Switzerland	3,600,000	3,048,000
Italy	6,250,000	6,100,000
South America	75,000,000	1,670,000
Oceania	21,000,000	1,350,000
Australia	1,000,000	250,000
New Guinea	10,500,000	0

Related Subjects. The reader is also referred to:
 Canada (Conservation and Development) Hydrostatics
 Conservation Niagara Falls, and
 Dam Niagara River
 Electricity Tennessee Valley
 Federal Power Authority
 Commission Turbine
 Water Wheel

WATER PRESSURE. See HYDRAULICS (City Water Supply).

WATERPROOFING is a way of treating cloth, leather, wood, or other materials so that they will shed water.

Many different chemical solutions are used in waterproofing. Nearly all of them work by forming a protective coating over the material to be waterproofed. Materials which have tiny holes, or *pores*, in them are often soaked in solutions of rubber, boiled linseed oil, paraffin wax, or some other substance which is itself waterproof. The waterproof solution fills the pores and coats the surface of the material.

Methods of waterproofing are most advanced in the textile industry, where there is a great demand for waterproof clothing and protective cloth coverings. The fibers of the cloth may be coated with a waterproof substance before they are woven, or they may be coated after the cloth is woven. Sometimes waterproof cloth is placed between layers of ordinary cloth. This is done in making mackintoshes, which are named for the Scotsman who first treated cloth with rubber.

The Japanese have waterproofed paper umbrellas for hundreds of years by dipping the paper in a solution of potassium dichromate and glue. A solution of shellac and borax is sometimes used for waterproofing paper. Leather may be waterproofed by dipping it in a bath of hot, melted paraffin.

E.C.BAL.

WATERPROOF MATCH. See MATCH (History).

WATER PURIFICATION. See FILTER; WATERWORKS.

WATERS, FATHER OF. See MISSISSIPPI RIVER.

WATERSHED. See DIVIDE.

WATER SOFTENING is a method of removing from water the minerals that make it hard. There are two chief means of softening water. Sometimes they are combined.

The *lime-soda* process adds soda ash (sodium carbonate, Na_2CO_3) and lime to the water. These combine with the calcium and magnesium in the water to make insoluble calcium and magnesium compounds, which settle to the bottom of the tank.

In the *zeolite* or *base-exchange* process, the water passes through a bed of certain hydrous silicates, minerals called zeolites. Zeolites have sodium in their composition. In the softener, they give up their sodium ions and take on instead the calcium and magnesium ions in the water. The zeolites can be renewed with salt brine. The zeolite process is preferred for some industrial uses. Because of its simplicity, it is widely used in small units such as private homes. The lime-soda process has many advantages for certain industries and for very large installations.

Some artificial resins, first made as substitutes for amber, can now be made to remove both metals and acids from water leaving it almost as pure as distilled water. This is a rather new discovery and was used in making kits to remove salt from sea water for fliers downed at sea.

A.M.BU.

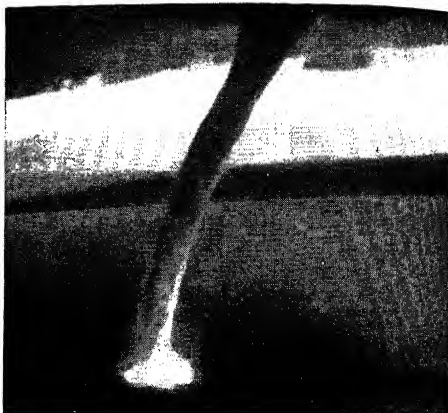
WATER-SOLUBLE VITAMIN. See VITAMIN.

WATER SPANIEL. See DOG (color plate, Sporting Dogs).

WATER SPIDER. See SPIDER.

WATERPOUT. A waterspout is a whirling column of air and water vapor extending from a cloud to the surface of a lake or an ocean. A waterspout is caused by a strong upward draft of air. The column revolves rapidly and produces an area of low pressure in its center.

Moist air rushes into this low-pressure area, is rapidly



Science Service

The Whirling Column of a Waterspout, reaching from the ocean's surface to a low cloud, is an amazing sight.

cooled and becomes visible as vapor. Thus, although waterspouts may draw up some water from the sea near their base, the greater part of the water they contain is fresh water. Large amounts of water sometimes fall on ships passing through waterspouts. But the danger to the ship is from the violently whirling wind, and not from the water. Waterspouts generally blow themselves out after a few moments, as the dust whirls one may see in city streets.

E.S.S.

WATER SUPPLY. See WATERWORKS.

WATER TABLE. See DRAINAGE; GROUND WATER.

WATER TABLE, a building term. See CARPENTRY (Siding).

WATERTON-GLACIER INTERNATIONAL PEACE PARK. See GLACIER NATIONAL PARK; INTERNATIONAL PEACE PARK.

WATERTON LAKES NATIONAL PARK. See CANADA (Scenic and Recreational National Parks).

WATER-TUBE BOILER. See BOILER.

WATER TURBINE. See TURBINE.

WATER TURKEY. See DARTER.

WATER-VASCULAR, *VAS kyoo ler*, **SYSTEM.** See ECHINODERM.

WATERWAY. See CANAL; LAKE (Travel and Trade Routes); OCEAN (Ocean's Importance to Man); RIVER (Work of Rivers).

WATERWAY, LAKES-TO-GULF. See LAKES-TO-GULF WATERWAY.

WATERWAY, SAINT LAWRENCE. See SAINT LAWRENCE WATERWAY AND POWER PROJECT.

WATER WHEEL. This device changes the energy of falling water into a form of mechanical energy which can be used for running machinery. The best source of water power in nature is found in waterfalls and rapids in rivers. The water is directed into the wheel through a chute. The wheel is mounted on an axle, which is connected by belts or gearing with the machinery it is to operate. The wheel has many curved blades. The water strikes the blades with great force and causes the wheel to spin. This spin makes the shaft rotate, which in turn rotates the shaft of the machinery that is being driven.

The amount of work done by a water wheel is equal to the weight of the water multiplied by the distance the water falls if there are no losses, such as friction losses.

There are two main types of water wheels, the vertical and horizontal. The vertical wheels include the two most familiar types, the overshot and the undershot. The horizontal wheels include the turbine, which is fully described under its own title.

The overshot wheel has a series of buckets around the circumference of the wheel. These buckets are so arranged that the stream of water falls on the wheel just above the center of the wheel. The weight of the rushing water causes the wheel to rotate. When the water-filled buckets reach the bottom, the water flows out and the buckets are refilled when they reach the top again. This type of water wheel is said to have a very high efficiency, which sometimes reaches 80 per cent.

The undershot water wheel is so constructed that the water strikes against the buckets of the wheel at the bottom. This type of wheel has such a low efficiency that it is rarely used. The efficiency is said to be as low as 25 per cent.

R.F.P.

See also AFRICA (color plate, Water Wheels on the Nile River); HYDRAULIC MACHINE; TURBINE.

WATER WITCH. See GREBE.

WATERWORKS. Man needs air to breathe, food to eat, and water to drink. But water has many additional uses in our daily life. We depend upon water for washing ourselves and our clothes. Air-conditioning systems use a great deal of water. Many industries could not run if there were not a large supply of water available every day.

In thousands of cities and towns in the United States there is a community system of water supply. As a result,

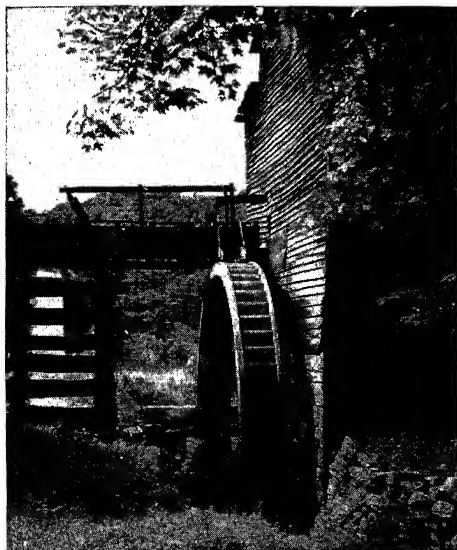
Americans use more water than do people in other countries. They average 100 to 150 gallons of water a day for each person. In some cities, such as Chicago, the average is much greater — between 250 and 300 gallons. In addition, many industries and firms have private wells to supply their own water. Usually the public water supply is owned by the local government, and the user of the water pays for the amount of water he uses.

There are several important problems in providing an efficient water supply for cities and towns. One is finding the source of the water. Another problem is purifying the water and making it suitable for human use. A third is moving it from its source to the places where it will be used.

The Source of the Water. Primitive people located their homes near water. At first they obtained their water from rivers, streams, ponds, and springs. Later they learned to dig wells for water. The Romans went farther. They brought water to their cities from distant mountains by means of aqueducts. Many cities such as Los Angeles and New York City follow the Roman practice. Huge aqueducts run from New York City to a number of large reservoirs in the Catskill Mountains. Other cities depend on near-by rivers or large lakes for their water. In Chicago, for example, water is drawn from Lake Michigan by means of tunnels two to four miles long. Smaller communities often rely on deep wells. The water is pumped up from the wells, purified, and stored until used.

Purifying the Water. Water is necessary to human life, but impure water is extremely dangerous. At one time, typhoid fever was a common disease in American cities, largely because people drank impure water which contained typhoid germs. Several methods are used to remove germs and other impurities from water. In some cases the water is filtered through layers of sand and gravel in filtration plants. In others, the water may be stored in a reservoir for a number of weeks. Then the impure particles drop to the bottom and the remaining water is clear. Chemicals are also used. When alum is put into water it forms large stocky flakes. These flakes collect the bacteria and other impurities from the water. Small amounts of chlorine are also placed in water to kill germs. Activated carbon, which tends to absorb gases, is put into the water to remove any bad odors. Odors can also be removed by *aerating* the water, that is, spraying it into the air and then collecting it again. Many cities use a combination of these various methods in purifying their water.

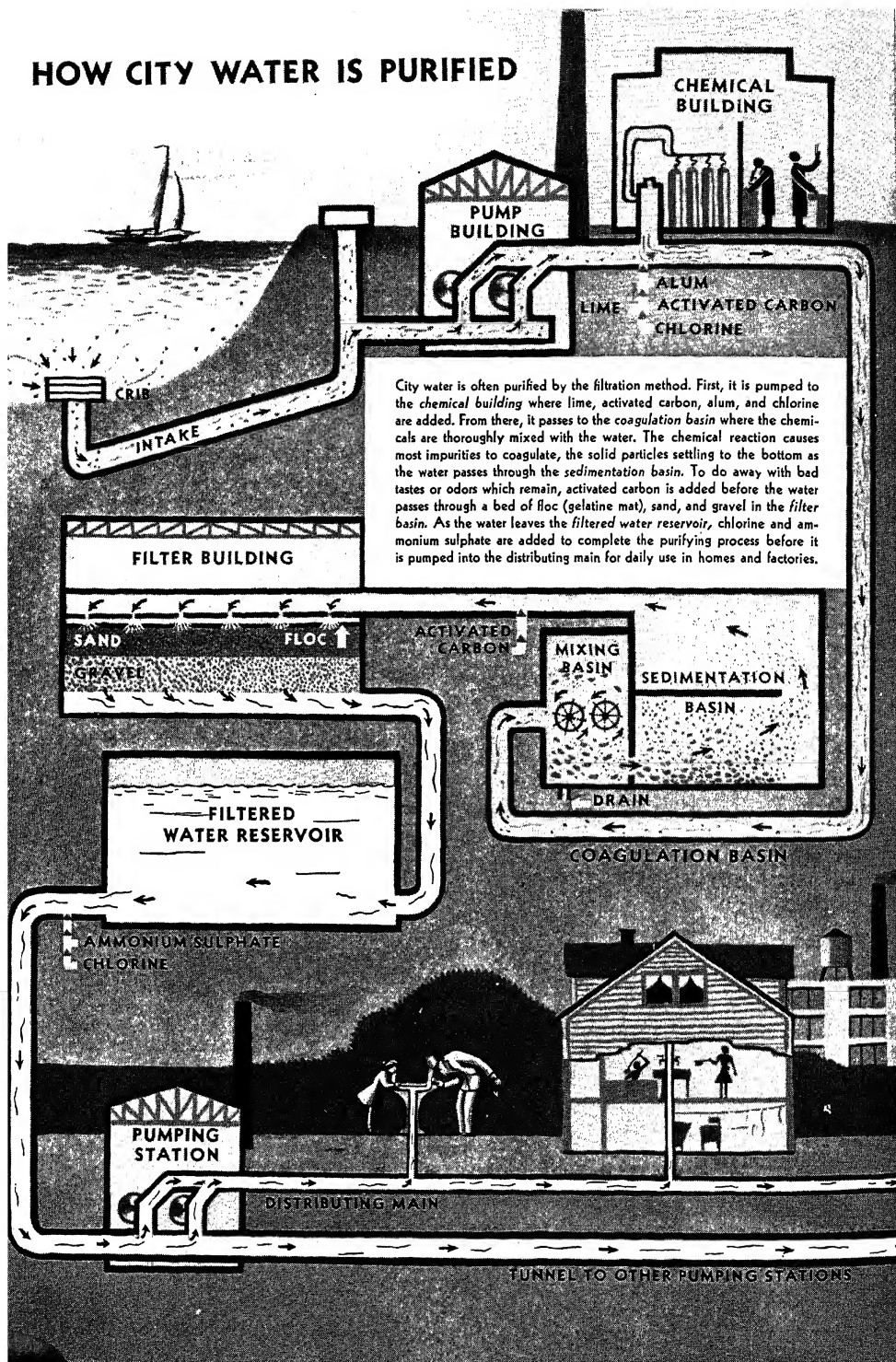
How Water Is Carried. Water that is brought from high reservoirs in the mountains usually has enough pressure to carry itself into a lower-lying city and up into the buildings of that city. Water brought from a near-by lake or well, however, must be pumped into reservoirs. These reservoirs may be made of masonry, wrought iron, or steel. Some of them are water towers called standpipes. Here the water is stored until it is needed by the user. In many cases cities that depend on gravity for the transporting of their water also use a pumping system in order to supply the high water pressure which is needed for fighting fires. In the skyscraper area of New York City, for example, the water is forced to the tops



Ewing Galloway

This Old Overshot Water Wheel in West Virginia is still in use after more than 150 years of service. Wooden levers over the chute control the flow of water to the wheel.

HOW CITY WATER IS PURIFIED



of the buildings by pumps. Many industries have separate standpipes and reservoirs on the tops of their own buildings to be sure of a constant supply of water.

Water is carried through a series of tubes which are called conduits and mains. These have a great many branches. These mains are made of cast iron or steel and usually have a diameter of four to forty-eight inches. Sometimes they are even larger. Water is usually brought into the property of an individual homeowner through pipes made of cast iron, galvanized iron, or copper. The total mileage of water pipes in great cities is very large. In Chicago, for example, there are at least 3,500 miles of water pipe.

Home Water Supply. In many areas where there are no central waterworks, individuals depend on a well for their source of water. The water is taken from a well by means of a pump which may be operated either by the wind, by electricity, or by a gasoline motor. It is stored in tanks which release the needed amount whenever necessary. Great care must be taken in protecting the well in the home against all possible sources of contamination. The well should be located at a distance from any places where human or animal wastes are likely to be found.

A.M.Bu.

Related Subjects. The reader is also referred to:

Aqueduct	Pump
Artesian Well	Reservoir
Chlorine	Sea Water, Purification of
Dam	Standpipe
Filter	Well
Hydraulics	

WATKINS GLEN. See FINGER LAKES.

WATLING ISLAND. See BAHAMAS.

WATSON, JOHN (1850-1907), was a Scottish clergyman and author who wrote under the pen name of Ian Maclaren. He won a reputation as a pulpit orator and lecturer in England and the United States. But he is probably best remembered for his stories of simple Scottish life. Some of his best stories are included in the collection, *Beside the Bonnie Brier Bush*. He was born at Manningtree, Essex, and was educated at Edinburgh University. After he studied for the ministry, he served at the Barclay Church in Edinburgh, and at the Free Church in Logiealmond, Perthshire. L.J.

WATSON, THOMAS AUGUSTUS. See BELL, ALEXANDER GRAHAM; TELEPHONE (History).

WATSON, THOMAS EDWARD (1856-1922), was an American journalist and political leader. He was born in Columbia County, Georgia, and was educated at Mercer College. In 1875 Watson was admitted to the bar and practiced law in Thomson, Ga. He served for a short time in the state legislature. Later he joined the Populist party, which represented the farmers, and edited a Populist newspaper. In 1890 Watson was elected to Congress on the Populist ticket.



Brown Bros.

Thomas Watson was active in the Populist party.

In 1904 he was candidate of the Populist party for President of the United States. In 1920 he was elected to the Senate and served until his death. See also **POPLIST PARTY**. E.E.Ro.

WATT, watt, is a unit for measuring power, or the rate at which work is being done. It was named for James Watt. In electricity, a watt is equal to the flow of one ampere at a pressure of one volt (watts = volts \times amperes). A *watt-hour* is the amount of electrical energy used to keep a one-watt unit working for one hour. To avoid using large figures, wattage is usually expressed in kilowatts (1,000 watts). Mechanical energy may also be measured in watts. A kilowatt is equal to about 1.34 horsepower, and 746 watts equal one horsepower. See also **AMPERE**; **HORSEPOWER**; **KILOWATT**; **VOLT**. D.D.E.

WATT, JAMES (1736-1819), was a Scottish engineer who is generally given the credit for inventing the steam engine. Actually, crude steam engines had been in-



Bundy Tubing Co.

James Watt Used Steam Coils to heat his office in 1784. This was the first practical use of steam for heating.

vented before Watt's time, but they had all proved impractical. These engines used a great amount of steam and produced only a small amount of power. Watt improved the steam engine to the point of practicality by putting in a separate condenser which reduced the amount of steam needed.

Watt, the son of a merchant and carpenter, was born in Greenock. The boy was at first a dull student and took little interest in his work. His chief pleasure was working in his father's carpenter shop. But at thirteen he took up the study of mathematics in his schoolwork, and attracted much attention by his ability in this subject. When he was eighteen he went to Glasgow to learn the trade of mathematical instrument maker. Later he continued this trade in London. In 1757 he returned to Glasgow and became mathematical instrument maker for the University of Glasgow.

In 1764 the university brought him a model of the Newcomen steam engine to repair. Watt became interested in steam engines and determined to make a practical engine. He worked on the theory that steam was an elastic body and would rush into a vacuum if a cylinder and vacuum tank were attached. The steam would therefore be condensed without cooling the cylinder. Watt finally took out a patent on his steam engine in 1769.

Five years later Watt became a partner of a Birmingham manufacturer, Matthew Boulton. In 1775 Boulton persuaded Parliament to renew Watt's patent for twenty-five years, and the partners organized a company to manufacture the engine. This firm was an immediate success and Watt was able to devote time and money to further inventions and improvements. He invented a throttle valve, a governor for regulating the speed of steam engines, a smoke-consuming furnace, a machine to reproduce sculpture, a copying press and copying ink, and many other devices. Watt also engaged in scientific research and worked out proof that water is a compound substance and not an element. In 1800 he retired. The power unit, the watt, is named in his honor. E.Y.

See also INDUSTRIAL REVOLUTION (Steam Engine); STEAM ENGINE; WATT.

WATTEAU, WAH TOH, JEAN ANTOINE (1684-1721), was a French artist who excelled in painting the manners and dress of the fashionable society of his day. Many of his pictures show court life during the last years of Louis XIV's reign. Watteau was born at Valenciennes of a poor family. He was apprenticed to an artist at an early age and at eighteen went to Paris. Watteau once worked as a sign painter, but after a few years his talent was recognized. S.O.

His Works include "The Embarkment for Cythera" and "The Italian Comedians."

WATTEAU GOWN. See DRESS (Eighteenth Century).

WATTERSON, HENRY (1840-1921), was an American newspaper editor. He served as editor of the Louisville (Ky.) *Courier-Journal* from 1868 to 1918. He retired because the paper supported the League of Nations while he opposed it. Watterson was born in Washington, D.C. His ability as an editor and speaker made him a power in national politics as early as 1872. E.S.W.

His Works include *Marse Henry*, an autobiography; *History of the Spanish-American War*; and *Abraham Lincoln*.



Brown Bros.

WATT-HOUR METER. See **Henry Watterson** was an influential American editor.

WATTLE, a shrub or tree. See ACACIA.

WATTS, GEORGE FREDERIC (1817-1904), was a British artist. The critics of his time called him the "poet-painter" because of the high poetical quality of his paintings. Many of his works were allegories, in which he used symbols to represent spiritual ideas. Watts also painted historical scenes and landscapes, but today he is most noted for his portraits.

Watts was born in London and studied art at the Royal Academy schools. In 1844 he visited Italy and made a study of the old Venetian masters. Watts first became famous as portraitist and did not begin painting his spiritual allegories until 1849.

In 1864 he married the sixteen-year-old actress, Ellen Terry, who served as the model for his picture "Sir Galahad." This marriage was an unhappy one and they were soon divorced. S.C.

See also GALAHAD, SIR (Illustration); TERRY, ELLEN, His Works include "Watchman, What of the Night?" and "Life's Illusions."

WATTS, ISAAC (1674-1748), was an English clergyman and hymn writer. Many of his hymns, especially "There Is a Land of Pure Delight" and "When I Survey the Wondrous Cross," became very popular. Watts also wrote *Divine and Moral Songs for Children*, which contains the poem beginning "How doth the little busy bee."



Brown Bros.

Isaac Watts wrote many well-known Christian hymns.

Watts was born at Southampton and was educated at London. He was a brilliant student, but injured his health by too much study. In 1702 he became a minister of the Independent Church in Mark Lane, London. Here he became famous as one of the best preachers of his time. In 1712 his poor health forced him to retire. R.K.N.

WAT TYLER'S REBELLION. In 1381, English laboring people rose in a struggle for civil liberty. The uprising was led by Wat Tyler, and was called Wat Tyler's Rebellion. It is also known as the Peasants' Revolt. The rebellion grew out of the miserable conditions under which the English common people lived. They were overtaxed and oppressed by unfair laws. Their patience finally gave out when the Crown ordered a new head tax.

Riots broke out in many parts of England. Mobs destroyed private property and killed many wealthy persons. On June 12, 1381, Wat Tyler and Jack Straw gathered together more than 100,000 angry peasants from Kent and Essex and led them in a march on London. The leaders demanded to see King Richard II. The king was a boy only fourteen years old. He faced the angry mob alone, because his royal advisers had deserted him. But he could not quiet the rioters, and finally agreed to listen to their demands at Mile-End on June 14.

The rebels demanded an end to serfdom, and a low rental payment on freed lands. They also called for a



Joseph Boggs Beale, Modern Enterprises

Blacksmith Wat Tyler Threatens a Tax Collector

repeal of oppressive labor laws. The young king agreed to their terms, and most of the mob disbanded. But Wat Tyler remained with about 30,000 supporters to gain further advantages for his people. He grew bold and demanding. His attitude led to his being killed by the Mayor of London. Meanwhile troops came up to support the king, and the rebels were driven away. The promises of the king were put aside and the oppression of the peasants continued. However Wat Tyler's Rebellion became the inspiration of popular movements for freedom and equality in England. J.S.S.

WAUGH, waw, "ALEC," ALEXANDER RABAN, and EVELYN ARTHUR ST. JOHN. are two English writers, brothers. Their father was Arthur Waugh (1866-1943), a literary critic.

"Alec," Alexander Raban Waugh (1898-) was born at Hampstead and studied at Sherbourne School. His first novel, *Loom of Youth*, which was published in 1917, was an attack on the management of the school. He left the Royal Military College at Sandhurst in 1917 to serve in the British Army. After the war he traveled, lectured, and wrote.

His works include *Kept; Nor Many Waters; Wheels within Wheels; No Truce with Time*; and *His Second War*.

Evelyn Arthur St. John Waugh (1903-) was born in London and attended Hertford College, Oxford University. Later he studied art in London and worked as a newspaperman. His first novels, *Decline and Fall* and *Vile Bodies*, were bitter and brilliant satires of English society. His *Scoop* was an attack on modern methods of journalism. His *Put Out More Flags* mocked the attitude of many members of the British upper classes in the early days of World War II. Waugh's *Brideshead Revisited*, a mystical and philosophical novel, was a best seller in the United States. G.S.B.

His works include *A Bachelor Abroad; Black Mischief; When the Going Was Good; and Waugh in Abyssinia*. Many of these are based upon his travel experiences, especially in Africa. *Edmund Campion* won the 1936 Hawthorned prize.

WAVE, SHORT. See **SHORT WAVE**.

WAVE BAND is normally a group of radio frequencies assigned for a single use. In the United States, the Federal Communications Commission assigns frequencies. In one meaning of the term, a wave band is a group used for one purpose — as broadcast, ship-to-shore, amateur, airplane, police. In another meaning, a wave band is a smaller group set aside for a single broadcaster, called a *station*.

Each radio transmitter is set so that its *carrier wave* will remain at a certain frequency. But audible sounds modulate, or change the frequency slightly. So each station is given a band of frequencies to prevent its interfering with another station. Most stations are allowed five kilocycles on either side of their carrier wave. For two stations to use the same frequency, they must be many miles apart to avoid interference.

Certain frequencies are better for one purpose than for another. Ordinary broadcasting is done on a low-frequency band reaching from approximately 500 to 1,500 kilocycles. High-frequency waves (short waves) travel longer distances on little power. They are set aside for amateurs, broadcasts to foreign countries, frequency modulation (FM), television, and other uses. P.H.G.

See also **ULTRA-HIGH FREQUENCY WAVES**.

WAVE LENGTH. See **LIGHT** (Electromagnetic Waves); **RADIO** (Radio Waves).

WAVELL, waw' vel, ARCHIBALD PERCIVAL, VISCOUNT (1883-), is a British soldier and statesman.



British Official Photo

Viscount Archibald Wavell was a British military leader in World War II.

He was born near his father's army post in Essex, and attended Winchester College and the Royal Military College at Sandhurst. During World War I, he served in France and in the Middle East. At the beginning of World War II, he was given command of all British army forces in the Middle East and successfully defended Egypt against an Italian invasion in 1940. In 1941 he was made commander in chief of all British forces in India, and in 1943 he was named

Viceroy of India. He was recalled in 1947. F.S.M.

WAVERLEY NOVELS. See **SCOTT, WALTER, SIR**.

WAVES are rising and falling motions which are passed on from particle to particle of a substance. They are caused by some disturbance. The most familiar kind of a wave is the rising and falling motion that is seen on the surface of water. But this type of motion is not found in water alone. There are other types of waves which cannot be seen and are known only by the effects they produce. These waves carry energy from one place to another. For example, sound is transferred from one point to another by waves known as sound waves. Light travels through space in another kind of wave known as light waves. Heat is also transferred from place to place by waves. Radio and television are possible because of the disturbances known as radio waves, which carry energy to the receiving set. Light, heat, and radio waves are forms of radiant energy. Other forms of radiant energy are ultraviolet rays, X rays, gamma rays, and cosmic rays.

In order to understand just what wave motion is, it is necessary to understand the simple water wave. If a stone is dropped into a pool of calm water, the surface of the water will soon be covered with many circles that will widen out from the center where the stone fell. The water will appear to be moving outward from the central point. This is not the case. The water does not really move outward at all. It simply rises and then falls again. It is the wave motion that moves outward. The energy of one wave is transferred on to the neighboring particles of water and causes another wave, which in turn causes still another wave, until a train of waves is produced.

Water waves in a lake or ocean are produced by the wind. These waves seem to be moving toward the shore. What actually happens is that the wind lifts particles of water and the force of gravity pulls the water down again. This causes the water to vibrate to a definite rhythm. To the eye it seems as though the water is moving forward. But there is simply a rising and falling in the same place. This can be proved by tossing a light substance, such as a cork, into a pool of wavy water. The cork will merely bob up and down as the wave

passes. It will not be carried forward with the wave.

The substance through which a wave travels is known as the *medium*. In the case of the water waves, water is the medium. We must remember that the medium itself does not move forward. It is the energy of the wave which moves forward. This movement is known as *wave motion*. Another example of wave motion can be shown by fastening one end of a rope to a rigid wall, and then rapidly moving the free end up and down. Each jerk travels along the rope and each portion of the rope transfers the jerk along to the next portion. Here again, the rope moves up and down, while the waves move forward.

All wave motions have certain characteristics in common. For one thing, all waves must have a medium in which to travel. Sound waves, for example, travel through some medium such as air, wood, or water. If there is no medium, sound can no longer travel. Unlike sound, light waves can travel through empty space. Another characteristic of all waves is that in a train of waves each wave follows the other at a definite interval. This means that every wave has a certain length and that it takes a definite time to travel from one place to another.

The length of a wave can be understood by noticing the water wave again. As the water moves up and down, the high point of the wave is called the *crest*. The low point, where the water goes down, is called the *trough*. One crest and one trough together form a wave. The wave length is the distance from crest to crest or from trough to trough. The two corresponding points, whether crests or troughs, are said to be in the same *phase*. A wave is measured not only lengthwise, but also by its height. The height of a wave is known as its *amplitude*. The amplitude of a water wave is equal to one half of the vertical distance between the crest and the trough. In other words, the amplitude of a water wave, for example, can be measured from the normal level of the water to either the highest or lowest point of the wave. The distance which the crest of a wave travels in one second is called its *velocity*. The number of crests that pass a certain point in one second is known as its *frequency*. The frequency of a group of waves describes the number of vibrations, or complete waves, per second.

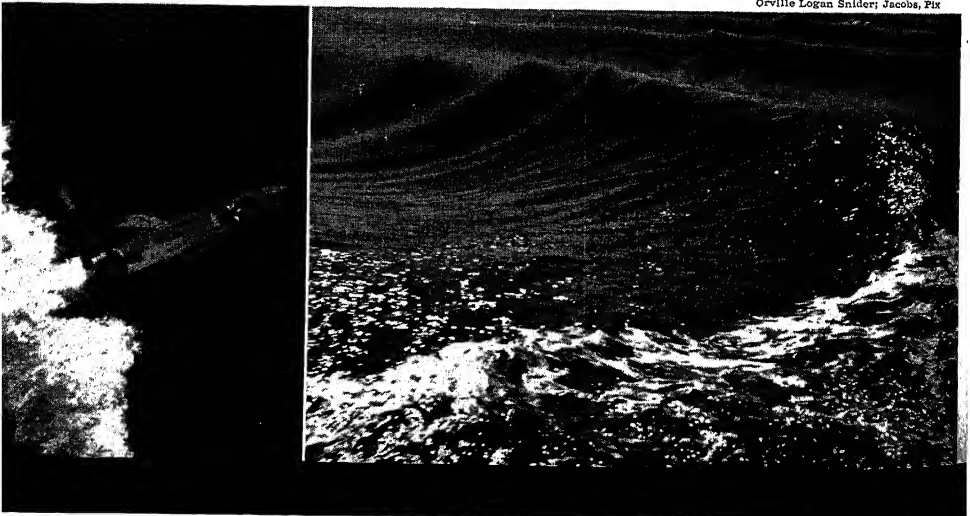
There is a definite relationship between velocity, frequency, and wave length. The velocity of a wave is equal to the frequency multiplied by the wave length. This is stated in the formula, $v = fl$, where v is equal to velocity, f is equal to frequency, and l is equal to wave length. For example, if the sound wave from a tuning fork has a wave length of 5 feet and there are 220 vibrations per second, the velocity of the wave would be 1,100 feet per second.

There are two basic types of wave forms. These are *transverse* waves and *longitudinal* waves. A transverse wave is one in which the particles of the substance move in an up-and-down direction while the wave moves forward in a horizontal direction. The direction in which the wave moves is known as the *line of propagation*. This means that in a transverse wave, such as a water wave, the substance moves perpendicularly to the line of propagation. Light waves have transverse properties. In fact, all the wave motions which are described as electromagnetic, such as radio waves, heat waves, and X rays, are transverse.

Longitudinal waves are also known as *compressional* waves. In this type of a wave, the particles of the substance move back and forth in the same direction as the motion of the wave. This means that the substance moves in the same direction as the line of propagation. The best illustration of a longitudinal wave would be to attach one end of a long wire spring to a wall. The first few turns of the spring should be compressed and then released. The turns will then compress the next few turns, and this will continue to the end of the spring. The same process occurs when air is the medium. As sound waves, for example, travel through the air, the air is compressed and then expanded. This process continues until the sound waves strike an object.

If a wave train, such as that of light, strikes the edge of an object, the direction of the wave is changed. This is known as *diffraction*. When two wave trains pass the same point in space at the same time, the effect that is produced is known as *interference*. For example, two sets of light waves that are equal in amplitude and of opposite phase, cancel each other and produce darkness. Similarly two sets of sound waves that are of opposite phase and equal amplitude cancel each other and pro-

A Surfboard Propelled by the Force of a Wave (Left) and a Series of Waves "Frozen" by the Camera (Right)
Orville Logan Snider; Jacobs, Pix



duce silence. Two sets of waves that are of the same phase may add to each other and increase the total amplitude.

A ray of light is a mixture of transverse waves that vibrate in all possible directions. By use of a special prism it is possible to sort out all of the waves except those that vibrate in one certain direction. This process is known as *polarization*, and the light that is passed is known as polarized light.

The quantum theory of physics has helped explain more fully the nature of light waves. According to this theory, when a substance gives off, or radiates, energy, the atoms of the substance vibrate. These vibrations travel as waves of definite frequency, depending upon the size of quanta, or energy units, emitted.

R.F.P.

Related Subjects. The reader is also referred to: Ether

Heat (Radiation)
Light (Nature of Light)
Quantum Theory
Radio (Radio Waves)
Reflection
Refraction
Sound
Tidal Wave

WAVES. Members of the Women's Reserve of the United States Navy are popularly called WAVES. The name WAVES is taken from the initial letters of the official Navy recruiting expression, "Women Accepted for Voluntary Emergency Service." The Reserve was created in July, 1942, so that women could fill jobs on shore establishments to release men for duty at sea. In August, 1945, there were 86,000 WAVES at 900 shore stations in the United States and Hawaii. In September, 1944, Navy women were allowed to serve outside the United States in such areas as Alaska, Hawaii, the Aleutians, Puerto Rico, and Bermuda. Enlisted boot training was given at Hunter College, New York City, and officer training was held at Smith College, Mass. WAVES were assigned to such duties as those of pharmacist's mates, aviation machinist's mates, storekeepers, yeomen, radio operators, mailmen, and aviation instructors.

WAVES wear the navy blue skirt and jacket. The WAVE insignia, worn on both lapels, is a fouled propeller and anchor. Enlisted women wear hats lettered *U.S. Navy*. The highest officer holds the rank of captain.

All WAVE enlistments and training were discontinued in August, 1945, except re-enlistments of former members. In 1948 Congress made the WAVES a permanent part of the Navy, with no restriction on place of service.

WAVE THEORY. See LIGHT (Nature of Light).

WAX. This hard, brittle, fatty substance is obtained from animal, vegetable, and mineral sources. Nature protects most plants, flowers, and fruits with a shield of wax. The layer of wax keeps in their supply of moisture and prevents damage to young plants from the sun's hot rays. Wax is not easily affected by oxygen, and moisture does not destroy its protective value. These properties make wax very useful to man. We have borrowed nature's use of the substance to protect and

beautify many man-made objects. As early as the 1500's the French protected their beautiful parquet floors with wax. These floors remained perfect and unscratched for hundreds of years.

Today, there are many kinds of wax and many uses for them. Most wax is a blend of animal, mineral, and vegetable waxes. Most of the waxes of commerce are made from *beeswax*, which bees manufacture while building their cells, *palm wax*, which coats the leaves of certain palms, and *paraffin wax*, which is distilled from petroleum. The blended waxes, which are solid in their natural state, are mixed into a liquid, called the *vehicle*, to make them easy to apply. The vehicle is usually turpentine or some similar substance which evaporates in air. The surface which is to be waxed is first thoroughly cleaned and dried. Then

the wax, either in paste or liquid form, is applied evenly. The vehicle evaporates, leaving a hard coating. When the coating is polished, it has a beautiful, mellow sheen. Paste wax, which leaves a very hard coating, is used to polish furniture. Liquid wax, which is easier to apply, is commonly used for floors.

Paraffin wax is also used to form an airtight covering on jars of fruit or vegetables and so protect them from harmful bacteria in the air. Many official documents bear a wax seal. The wax is melted — usually at a temperature not higher than 145° Fahrenheit, and placed over the closed envelope flap. Thus, there is the telltale sign of broken wax if the envelope is opened illegally.

Spermaceti, a wax which comes from the oil of the sperm whale, is used in toilet creams. *Wool wax*, from the oil glands of the sheep, is used as a dressing for leather goods. Bayberry candles are made from the wax which covers the berries of the candleberry or wax myrtle.

G.R.G.

See also BEESWAX; CANDLEBERRY; PARAFFIN; SEALING WAX; SPERMACEITI.



U.S. Navy

A United States Navy WAVE in the white service dress uniform worn by officers of the women's reserve in warm weather. In cold weather, WAVES wear blue.

WAX BEAN. See BEAN (Kinds of Beans).

WAXBERRY. See CANDLEBERRY.

WAXED PAPER. See PAPER (Special Kinds of Paper).

WAX MYRTLE is a large evergreen shrub or small tree found along the eastern coast of the United States, and as far west as Texas. It grows as high as thirty-five feet, and has grayish flowers. The two- to three-inch leaves are alternate along the branches. The wax myrtle is quite handsome, and is grown as an ornamental shrub in many gardens and lawns. It does best in a damp soil which contains peat.

W.M.HAR.

Classification. Wax myrtle is *Myrica cerifera* in the *Myricaceae* family.

WAXWING is a sleek, silky-feathered brown bird larger than a sparrow, with a conspicuous crest or topknot. It has a band of yellow across the end of its tail,



The Jaunty Cedar Waxwing attracts the observer's attention by its smooth satiny plumage, and by the ease with which it can be approached closely, except during nesting season.

and red, waxlike drops on its wing feathers.

The cedar waxwing is the best known of these birds. It lives in most parts of North America, building its nest as far north as central Canada and Labrador. These birds fly quietly about in small flocks. They eat berries and fruits, or dart from some high perch in search of insects. The nest is rather bulky, and is usually built in a fruit or shade tree. Many cedar waxwings are found on the islands of Lake Superior and around the lakes of northern Minnesota and Ontario in the summer. The birds cannot sing, but are able to utter a few high hissing notes. The female lays three to six eggs which are a pale bluish gray, speckled with black.

The *Bohemian waxwing* is a slightly larger bird. It has yellow marks on its wings and reddish-brown undertail coverts. It lives in the northern latitudes of the world. In the winter it appears in the northwestern and

central northern United States, particularly the upper Mississippi Valley.

Waxwings are helpful to the farmer because of the insects they eat. But in many places they sometimes become pests around cherry trees.

Classification. The waxwings belong to the family *Bombycillidae*, formerly *Ampelidae*. The cedar waxwing is *Bombycilla cedrorum*; the Bohemian, *B. garrula*.

WAYBILL is a name sometimes given to a bill of lading. See BILL OF LADING.

WAYLAND THE SMITH is a hero of Teutonic mythology. He is also known as Weland, and in Norse as Volund. According to mythology, Wayland was one of three brothers who married warrior-women known as Valkyries. After nine years their wives left them. The other brothers went in search of their wives, but Wayland remained behind. He became very rich as a smith, and the Swedish king, Nidudr, was jealous and captured him. Nidudr made him lame by cutting his leg, and then forced Wayland to work for him. But Wayland revenged himself on Nidudr by killing the king's children. He made golden ornaments of their skulls, eyes, and teeth. Then he presented these ornaments to the king as gifts and successfully made his escape. See also VALKYRIE.

P.V.B.J.

WAYNE, ANTHONY (1745-1796), was an American soldier in the Revolutionary War. He was called "Mad Anthony" Wayne because of his reckless courage. Wayne was the hero of the recapture of Stony Point in 1779, one of the most daring attacks of the war.

Wayne was born in Waynesborough, Pa., and was educated at a private academy in Philadelphia. He served in the Pennsylvania legislature for a time. When the war broke out in 1775 he raised a regiment for the Canadian campaign and later protected the retreat of this force back to Fort Ticonderoga. Wayne led a division at Brandywine and commanded the right wing at Germantown. Later he rescued the Marquis de Lafayette and took part in the siege of Yorktown.

In 1783 Wayne was made a brevet major general, but retired a year later. In 1791 he represented Georgia in Congress, but was defeated for re-election the following year and returned to the army. In 1794 he fought the



Brown Bros.

"Mad Anthony" Wayne Cheering on His Men as they storm the walls of Stony Point, held by British Redcoats.

Indians in Ohio and defeated them at Fallen Timbers. The following year Wayne made a treaty with the Indians which secured for the United States a great piece of land near Greenville, Ohio. Wayne continued as commander of the reorganized army until his death. N.G.G.

See also **REVOLUTIONARY WAR IN AMERICA**.

WAYNE UNIVERSITY is a coeducational school in Detroit, Mich. It is supported by the state and the city and is operated by the Detroit Board of Education. The university includes colleges and schools of liberal arts, education, engineering, medicine, pharmacy, nursing, law, industrial health, public affairs and social work, and business administration. It also has a graduate school. Courses lead to B.A., B.F.A., and B.S. degrees, as well as a number of other specialized degrees. The school was founded in 1929 as the Colleges of the City of Detroit, and organized as Wayne University in 1933. Average enrollment is about 10,000. C.B.H.

WAYS AND MEANS COMMITTEE. This powerful committee of the United States House of Representatives has jurisdiction over taxation and tariff legislation and other important financial matters.

WAYSIDE INN is the name of the Longfellow shrine and colonial museum near Sudbury, Mass. It was built in 1686 and was first known as the Red Horse Inn. Many distinguished guests such as George Washington and the Marquis de Lafayette were entertained here. Henry Wadsworth Longfellow's *Tales of a Wayside Inn*, an imaginary account of the tales told by the inn's fireside, made the place famous. Henry Ford bought the building in 1923 and partly restored its original appearance with reproductions of colonial furnishings. The Wayside Inn has served guests continuously since it was established, except for a period between 1860 and 1896.

W.C.T.U. See **WOMAN'S CHRISTIAN TEMPERANCE UNION**.

WEAKFISH, or **SQUETEAGUE**, *SKWEE teeg*, is a salt-water food fish of the croaker family. It reaches a length of one foot to two feet or more. Although *sea trout* is one of its common names it is not a trout, and is not even closely related. The squeteague lives along the eastern and Gulf coasts of the United States from Massachusetts to Texas. There are four kinds, the *common squeteague*, the *spotted squeteague*, the *silver squeteague*, and the *sand squeteague*. They usually weigh less than fifteen pounds, but the common squeteague sometimes weighs thirty pounds. All are fine food fishes. C.L.Hu.

Classification. Squeteagues, or sea trout, are classed as *Cynoscion* in the *Sciaenidae* family. The common species is *C. regalis*, the spotted is *C. nebulosus*, the silver squeteague is *C. nothus*, and the sand squeteague is *C. arenarius*.

WEALTH. The term *wealth* refers to material economic goods. Goods are means of satisfying human wants. There are two chief kinds of goods — free and economic. Free goods, such as air and sunshine, are those which are so abundant that no price can be put on them. Economic goods are those which are so scarce that people are willing to pay for them. Most goods are economic goods.

There are two principal kinds of economic goods — consumer goods and capital goods. Capital goods are described in **THE WORLD BOOK ENCYCLOPEDIA** under the

title **CAPITAL**. Consumer goods include durable goods, such as automobiles, books, and household furnishings, as well as less durable and quickly perishable goods, such as clothing and food.

Wealth (economic goods) has three qualities. To be wealth, an article must have *utility*, that is, the power to satisfy wants. It must also be *limited* in amount. And it must be *transferable*, or capable of being possessed. The production, evaluation, distribution, and consumption of wealth make up the primary subject matter of the science of economics. H.G.Mou.

Related Subjects. The reader is also referred to:

Consumption	Profit
Credit	Rent
Economics	Supply and Demand
Interest	Thrift
Money	Value
Price	

WEAPON, *WEP un*. Weapons have played an important part in the history of man. Without weapons man could not have conquered vast areas of wilderness or defended his home and family from enemies. But weapons also have played a tragic part in the history of civilization. Wars have been made more and more horrible by the development of new weapons which can kill more and more people, and destroy more of the worthwhile things man has built in times of peace. Today, atomic power has made possible weapons so destructive that many persons feel man no longer has any defenses against his own power to destroy. The continued use of such weapons will destroy civilization, unless man learns to solve his problems without resorting to war.

Weapons may be divided roughly into five classes: (1) crushing, piercing, or cutting weapons; (2) explosive weapons; (3) chemical weapons; (4) bacteriological weapons; and (5) atomic weapons.

Crushing, Piercing, and Cutting Weapons were among the earliest devised by man. The first weapons probably were rocks which early men picked up to crush out the life of prehistoric animals. Human skulls from prehistoric times have been found crushed in a manner which indicates that a heavy blow with a rock or club was the cause of death. Piercing weapons progressed from the early flint knives and daggers to spears, lances, various kinds of swords, and the modern bayonet and Com-mando knife.

Explosive Weapons developed in the 1300's, when gunpowder was put to use in muskets and cannons. Hundreds of different kinds of explosive weapons have since been developed for use on land, at sea, and in the air.

Chemical Weapons were first used by the ancient Greeks, who developed Greek fire. Chemical weapons such as the flame thrower and gas bomb have been important in modern warfare.

Bacteriological Weapons using germs to spread disease among military and civilian groups, have been developed but rarely used in modern warfare. Such weapons are a terrible threat, however, as long as war exists.

Atomic Weapons are the greatest threat to civilization, since there is little or no defense against them. (See **ATOMIC BOMB**.) The power of the atomic bomb was demonstrated when two of them practically destroyed two Japanese cities near the close of World

War II. Military experts predicted that in the future robot planes and guided missile rocket bombs could be provided with atomic bomb warheads.

R. Col.

Related Subjects. The reader is also referred to the following articles and their lists of Related Subjects:

Army (Related Subjects:	Firearm
Historic Warfare)	Knife
Arsenal	Ordnance
Artillery	Projectile
Chemical Warfare	Sword

WEASEL, WE z'l. Weasels are small furry animals whose white winter coats give us the fur called ermine. Any weasel in its winter coat may be called an ermine, but some do not have such fine fur as others. The *weasel family* also includes martens, badgers, skunks, and otters, besides weasels themselves.

Weasels are flesh-eating, or carnivorous, animals. They are slim, swift, and very blood thirsty. They have keen sight and smell, and are good hunters. These animals never seem to grow tired chasing rats, mice, rabbits, and birds. At times they seem to kill merely for fun, because they often leave dead bodies without eating them. Weasels sometimes kill farm poultry. But they can also be useful when they destroy troublesome pests. Weasels are known for their unpleasant odor, which is easiest to notice when they are frightened or irritated.

The *long-tailed weasel* is the best-known kind in North America. It has a white belly and dark brown back, with a black tip on its tail. The tip of the tail stays black even when the rest of its coat turns white to match the snow. The female of this weasel is about thirteen inches long. The male is about sixteen inches.

The *short-tailed weasel* is smaller. The male is about eleven inches long, and the female, nine inches long. The tail is about two inches long. This animal produces most of the American ermine. It lives in many places throughout the United States and Canada. Its brown

parts are lighter than those of its long-tailed relative, and its white parts are yellower.

The *least weasel* also lives in North America. It is the smallest known carnivorous animal. In Texas and Florida there are other kinds of weasels which do not turn white in winter. The male is eight inches long and the female is six.

H.E.A.

Classification. Weasels belong to the family *Mustelidae*. The long-tailed weasel is *Mustela noveboracensis*. The short-tailed weasel is *M. cicognani*. The least weasel is *M. rioxosus*.

Related Subjects. The reader is also referred to:

Badger	Mink	Sable
Ermine	Otter	Skunk
Ferret	Polecat	Tayra
Marten	Ratel	Wolverine

WEATHER, WETH er, is the changing condition of the air, or atmosphere, which surrounds the earth. When we speak of weather we usually mean daily changes in temperature, sunshine, clouds, wind, rain, snow, and dampness that we can feel but not see.

Weather is not the same as climate. Climate is the average condition of the weather, such as average temperatures, amounts of rain or snow, averages of sunshine, wind, and humidity, and the number of days when certain weather conditions may be expected in a month or year.

Our Atmosphere

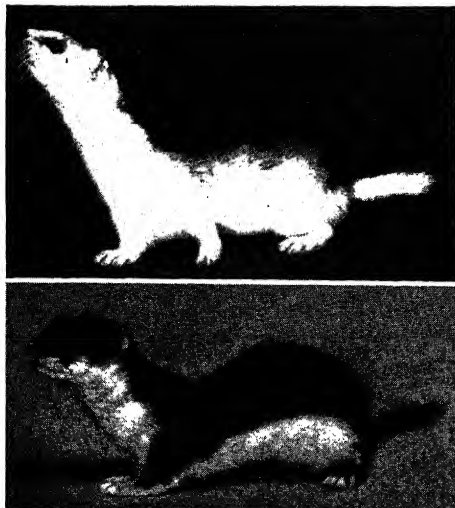
Shooting stars and northern lights show that there is extremely thin air about 200 miles above the surface of the earth. From that height the air gets denser downward to the earth's surface. More than half of the atmosphere by weight is found below a height of four miles. The lowest layer, called the *troposphere*, contains nearly all our weather.

In the troposphere the temperature of the air becomes colder the higher we go until it is about -50° to -80° Fahrenheit at the top. In the layer above, called the *stratosphere*, the temperature is very low but does not get colder as we go higher.

For thousands of years man did not know what the air was made of. About two hundred years ago it was shown that air is a mixture of gases, mostly nitrogen (78 per cent) and oxygen (21 per cent). It also contains carbon dioxide, some argon, varying amounts of water vapor, and traces of other gases. Oxygen is breathed by all animals, and it is also necessary for burning fuels. Carbon dioxide is important to plant life. Water vapor gives us our water supply in the form of rain or snow.

Wind is air in motion. It moves because of differences in temperature. Heat makes air lighter and it is forced upward by heavier air which moves in to take its place. Air heated by a stove is pushed upward by cooler air in the room, which flows toward the stove. This air in turn is heated and rises. This unequal heating sets up a circulation of the air in the room. In much the same way, the sun heats the air near the equator more than the air in regions nearer the poles. Heated air near the equator becomes lighter and moves upward and outward in the direction of the poles. Heavier polar air lower down tends to move toward the equator. This sets up a circulation caused by unequal heating of the atmosphere.

Weight and Pressure of Air. Air is very light. But the total weight of the earth's atmosphere is more than five thousand six hundred million million tons. This number

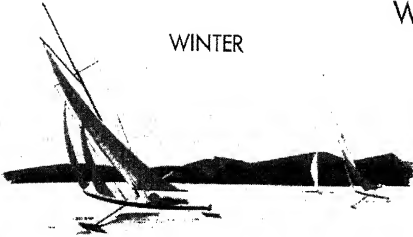


Ernest P. Walker

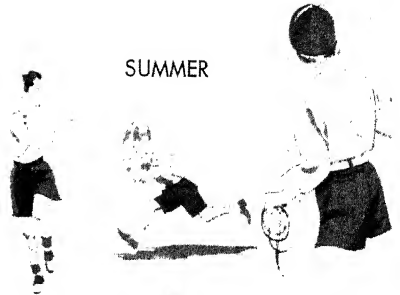
The Dwarf Plains Weasel (top) is changing from its white ermine winter coat to its darker summer fur. Below is the weasel after the color change has been completed.

WEATHER

WINTER



SUMMER



WIND



Snow

PRECIPITATION

Rain



Cold

TEMPERATURE



Hot

Warm

(5,600,000,000,000,000) is too big to understand. Everywhere at sea level the weight of the air is more than fourteen pounds per square inch. This weight or pressure would crush buildings if it were not for the fact that it acts in all directions and therefore presses outward as well as inward. If we could pump the air out of a building in such a manner that none would leak in again, the building would soon collapse. This shows that great forces of the atmosphere are always at our very elbows. When they are disturbed to any great extent, the results are likely to be important or even disastrous.

The Sun's Heat and the Earth's Surface

Changes in pressure are caused by changes in temperature, due to unequal heating of the atmosphere. The heat received from the sun changes from day to night, and with the seasons, as the earth moves around the sun. Irregularities in the earth's surface also cause changes in temperature. The sun's heat warms the land more rapidly than it does the oceans. Land cools at night and in winter more rapidly than the oceans do. Different kinds of soil change temperature at different rates. These local differences in temperature cause local winds which vary in force from gentle land and sea breezes to thundershowers and other local and sometimes more violent storms.

Variations in the earth's surface also affect *precipitation*, which is a general term for rain, snow, hail, sleet, and other forms of moisture which fall to the earth either as liquid or solids. The explanation of precipitation is that when air rises it becomes cooler. The amount

of water vapor in the air depends on the temperature. When rising air is chilled, some of the water vapor condenses into droplets that we can see, just as warm, moist breath becomes visible in cold air. This produces clouds in the sky or fog near the ground. Some of the moisture falls from clouds as precipitation. If the cloud temperature is above freezing, the precipitation will be rain. If it is near freezing or below it will be snow, sleet, or some form of frozen moisture.

When air flows up a mountain slope or for some other reason is forced to rise, it is chilled. Clouds form, and there is likely to be precipitation. When air descends it becomes warmer and drier and there is no precipitation. That is why there may be heavy rain on one side of high mountains and a desert on the other side. Such weather is found along the Pacific Coast of the United States.

Precipitation takes moisture out of the air. Evaporation by wind and sun on water surfaces, chiefly the oceans, puts new water vapor into the air. The total supply in the atmosphere remains nearly the same.

Effects of Earth Rotation

Winds would move on a straight course if the earth did not turn on its axis. The turning of the earth causes winds in the Northern Hemisphere to curve toward the right and in the Southern Hemisphere toward the left. This is explained by means of Ferrell's law. The sun's heat and the turning of the earth combine with other influences to produce certain wind belts around the world. The United States lies mostly in the belt of westerly winds. These are winds which started toward

the poles but were turned to the right by earth rotation. As a result, the movement of weather across the United States is generally from the west toward the east, but sometimes from the northwest toward the southeast or from the southwest toward the northeast.

When pressure of the air is high, the winds tend to blow outward. Where pressure is low, they tend to blow inward. The rotation of the earth causes these winds also to move in curved paths. Wind systems with high and low pressure are called *highs* and *lows*. They move with the west-to-east wind currents of the United States.

Where Our Weather Comes from

In winter, lows enter North America along the Pacific Coast and bring moist air and rain or snow to the western states and the Rockies. They generally turn to the southeast over the middle part of the country and then to the northeast in the Appalachian region or Atlantic states. East of the Rockies they bring moist Gulf and Atlantic air which causes rain in the southern states and rain or snow in the northern states. Some lows become storms with strong winds and heavy rain or snow.

Most lows are followed by highs which bring colder winds from more northerly points, generally with clear skies. Between these warm and cold air masses there is often quickly changing weather in narrow zones which are called *fronts*.

In spring and autumn the movement of weather is much the same, but the prevailing west wind currents are not so strong as in winter. The changes of weather are not so rapid or severe. In summer the atmosphere over the United States usually is quiet or moving slowly. The weather is warm or hot and local storms and thunderstorms cause much of the rainfall. Air from the tropics sometimes moves in over the southern states in the summer. This brings in weather from the Gulf and West Indian region and occasionally a hurricane to the Gulf Coast or the Atlantic Coast.

How Weather Affects Us

Everybody is affected in mind and body by climate and changes in the weather. A long period of the same kind of weather may be depressing or irritating. The constant heat of the tropics is depressing but an occasional hot day is not. Unless changes of weather are too severe, they are stimulating to mind and body. Human comfort depends largely on temperature but also on air movement and moisture in the air. In general, more air movement makes temperature seem lower. When hot air is moist it feels hotter than dry air at the same temperature.

An in-between climate with frequent but mild changes in the weather is usually considered the best kind. Most of the vigorous and progressive peoples are found in fairly cold climates with large seasonal changes of weather. It is well known that climate is important in the treatment of disease. The choice of climate depends on the kind of disease and the physical condition of the patient. Climate is the direct source of certain ills such as sunstroke, snow blindness, and frostbite. Many diseases occur mostly at certain seasons, such as infantile paralysis in late summer and the common cold in winter.

Importance of Weather

Weather affects nearly all human activities. Aviation, for example, is unsafe without weather reports and forecasts. Farming would be subject to great losses of crops and livestock if forecasts and warnings were discontinued. Weather is also very important in modern warfare, especially in the use of air power. Little-known examples of the influence of weather include preparation of cereals, flour, baked goods, and confectionery for market, where advance knowledge of humidity is important. Forecasts of temperature and cloudiness help power companies in large cities in meeting heavy demands for heat and light. The use of rainfall forecasts helps to plan the use of water power.

Weather Proverbs and Superstitions

There are many old weather proverbs. Some have a good scientific basis, but many are the outgrowth of superstition and ignorance. There was an Indian proverb, "When the sun is in his house it will rain soon," which meant a halo or ring around the sun. Halos are caused by ice crystals in high clouds which sometimes appear in upper air currents in advance of storms. On the other hand, Groundhog Day is the outgrowth of an ancient superstition that, "If Candlemas be fair and clear, there'll be two winters in the year." Therefore it is said that if the groundhog sees his shadow on February 2 (Candlemas), spring will come late. Weather records covering many years have proved that this belief is false.

The only really profitable way to forecast the weather is by the use of weather maps based upon the correlated observations of many weather stations. I.R.T.

Related Subjects. The reader is also referred to:

Air (with list)	Temperature
Climate (with list)	Weather Forecasting
Humidity (with list)	(with list)
Season	Weather Vane
Storm (with list)	Wind (with list)

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 KRAFFT, PETER ERVIN. *Meteorology for Ship and Aircraft Operation.* Cornell Maritime, 1942. For the reader who wants a good practical knowledge of weather.
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WEATHER BUREAU, UNITED STATES

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Questions

What is the difference between weather and climate?

What different things do we consider when we speak of weather?

Where in the atmosphere is nearly all of our weather formed?

What happens to the temperature as we go up higher into the atmosphere?

In what wind belt does most of the United States lie?

In what direction do storms usually travel across the United States?

What type of climate is considered best? Why?

WEATHER BUREAU, UNITED STATES, is an agency of the Department of Commerce, which is charged with observing, recording, and forecasting the weather. The Bureau has a central office in Washington, D.C., and eight regional offices in New York City; Atlanta, Ga.; Chicago; Fort Worth, Tex.; Kansas City, Mo.; Los Angeles; Seattle, Wash.; and Anchorage, Alaska. In the United States and its possessions there are 450 stations which localize the work of observing the weather and giving out the forecasts. The staff includes more than 3,000 Civil Service employees, many of whom have had special training for the work. In addition, thousands of interested citizens assist without pay by keeping daily local records of the weather. These volunteers use equipment supplied by the Bureau.

Observations are taken every hour at 400 stations on the airways, and at three-hour or six-hour intervals at other stations. Four pilot balloon soundings are made daily at 175 points and radiosonde (or rawinsonde, which is equipped with radar) observations twice daily at 60 places. More than 60,000 miles of teletype networks collect and distribute the data.

Reports, forecasts, warnings, and advices based on the teletype data are broadcast by radio, and are also given to the public in the Bureau's printed bulletins, by the newspapers, and by telegraph or telephone. Many field offices are connected to radio broadcasting stations and the local forecasters speak directly to the public. This is of great value in giving warning of storms, floods, cold waves and other severe conditions. The Bureau has full co-operation of press and radio in great weather emergencies as, for example, in advance of hurricanes.

Weather reports are exchanged with Canada, Mexico, and other countries, including nearly all the countries of the Northern Hemisphere and some of those of the Southern Hemisphere. The merchant ships of the world furnish weather reports by radio four times daily while on voyages at sea, and these reports are included in daily exchanges between countries to complete special maps for study of the broad features of the weather around the world.



The Mapping Section of the U.S. Weather Bureau records and maps weather conditions in all parts of the world.

A scientific research staff is maintained in Washington for study of new ideas and better methods, with the main object of increasing the accuracy of the forecasts.

By act of Congress in February, 1870, the public weather service of the United States began as a part of the Signal Corps. It was moved from the army to the Weather Bureau of the Department of Agriculture by act of October 1, 1890, and to the Department of Commerce on July 1, 1940. These moves did not change the main duties, but they have been extended at various times to provide service in new fields.

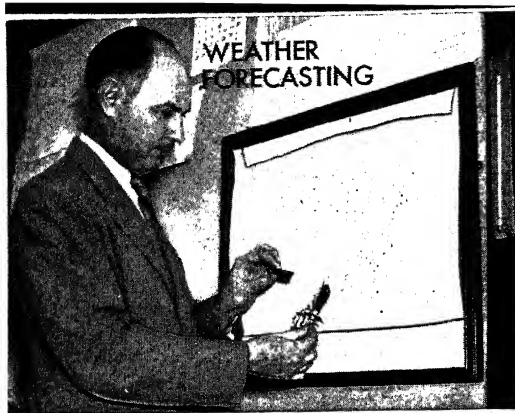
The history of the weather bureau actually may be considered to go back further than the act of 1870. In 1817, Joseph Meigs who headed the Land Office, began a system of recording the weather in the various branch offices of this organization. The great American scientist, Joseph Henry, began to publish the first weather forecasts in 1849, when he was director of the Smithsonian Institution. These forecasts depended upon the quick exchange of information made possible by the telegraph.

The chief duties of the weather bureau are: (1) warnings of dangerous storms on the Great Lakes, seacoasts, and near-by oceans; (2) measurements of river stages and rainfall and sending out flood warnings; (3) reports and forecasts for safety of air travel; (4) weather advices for farmers including special service for fruitgrowers and stockmen; (5) weather forecasts to help control fires in the forests; (6) aids to shippers, especially to protect vast quantities of food moving from producer to market; and (7) recording climate conditions of the United States and its possessions and keeping data on the climates of all other parts of the world.

The Bureau in its daily work reaches more persons in the United States than any other government agency except the Postal Service.

See also **WEATHER**; **WEATHER FORECASTING**.

WEATHER FORECASTER. See **AVIATION** (Vocational Opportunities); **WEATHER FORECASTING**.



WEATHER FORECASTING from weather maps, as it is done today, was begun only about 100 years ago. Before that time people paid much attention to signs such as clouds, changes of the barometer, changes of wind, and the sky at sunset and sunrise. Beginning in 1820, weather maps were drawn now and then from reports gathered by mail, but they were received too late to be of use. After telegraphing began in 1844, the operators told each other daily what kind of weather they had and made predictions for other points on the lines. Scientists later began collecting weather reports by telegraph and putting them on a map so they could predict movements of the weather from place to place. The same basic plan is used today, but in much greater detail.

Value of Weather Forecasting. When it became known that maps could be used to forecast the weather, the first idea was to give warnings of storms which had been wrecking so many ships on the seacoasts and Great Lakes. This was the purpose of the first government forecasts in the United States in 1870. More recently the services of the Weather Bureau have been extended to nearly every phase of human activity. In a recent survey of the value of weather service in the United States, it was found that increased profits to business and the savings from protection of property amounted to more than three billion dollars a year. Farmers, store owners, and athletic promoters all profit from weather forecasting.

How the Weather Is Forecast

Reports from hundreds of places, all made at about the same time, are collected from a wide area and used to map the weather. This operation is repeated every six hours, or oftener. Maps of smaller areas are made every hour at some airports. These maps give a broad view of the weather over the United States and near-by countries and oceans. They show the lows and highs, the air masses and fronts, and also temperature, precipitation, and other conditions. Movements from map to map are studied and forecasts are issued daily, giving the kind of weather expected in the next six to forty-eight hours. The time in advance depends on the type of forecast. When dangerous conditions are shown on the map, warnings are issued at once to the threatened areas.

For example, the forecaster making the forecasts for Ohio knows from experience where to look for changes of weather that may affect that state. He watches the highs, lows, and air masses to the northward and westward of Ohio for cold weather, or for any changes in pressure and wind that may bring colder or warmer

WEATHER FORECASTING

weather. For Ohio temperature forecasts, he watches certain key stations to the west or northwest. He also notes conditions to the south and west to see if moist air is likely to be drawn northward to cause rain or snow. For precipitation forecasts he keeps an eye on lows and fronts in Texas, Oklahoma, and the Midwest in general. For forecasts further in the future he looks at conditions farther to the westward or northwestward. His assistants also draw maps of the upper air so that he can see how the winds, temperatures, and amount of water vapor in the upper air may affect Ohio weather.

In the early days, Medicine Hat in Alberta, Canada, was called the home of blizzards. But reports now received from Canada and Alaska show cold air masses coming from territory to the north and northwest of Medicine Hat. Therefore this town is no longer considered especially important. During World War II, the strategic location of Greenland weather stations in the area from which much European weather comes moved the Germans to try to capture them or install secret stations of their own.

How to Make and Read the Weather Map

The complete weather map shows many elements. The most important are pressure (barometer reading), temperature, humidity, force and direction of the wind, cloudiness, precipitation, visibility, height of clouds, and special conditions such as thunderstorms, hail, dust, frost, fog, and smoke.

At the location of each reporting station, a small circle is printed to show the sky. Weather at Cincinnati, for example, is entered in figures and symbols around the circle with an arrow to show wind force and direction. The circle is filled or partly filled with the pen to show the amount of cloudiness, or left open to show clear sky. All the reports are entered rapidly for many stations, and the map is then ready for study.

Each forecast office pays special attention to its own district or area. First the forecaster looks for the principal air masses and the fronts between them. This is important, because a new air mass may move over the forecast district and it may, for example, be cold and dry or warm and moist. Study of the air masses is called *air mass analysis*. On the forecasters' map the fronts between the air masses are drawn in color. On printed maps the fronts are lines having many sharp or rounded points on the side toward which the front is moving.

The blue *cold front* shows where cold air is moving under warm air. Along the cold front and to the westward there is often squally or stormy weather, becoming colder, with showers, thunderstorms, or snow flurries.

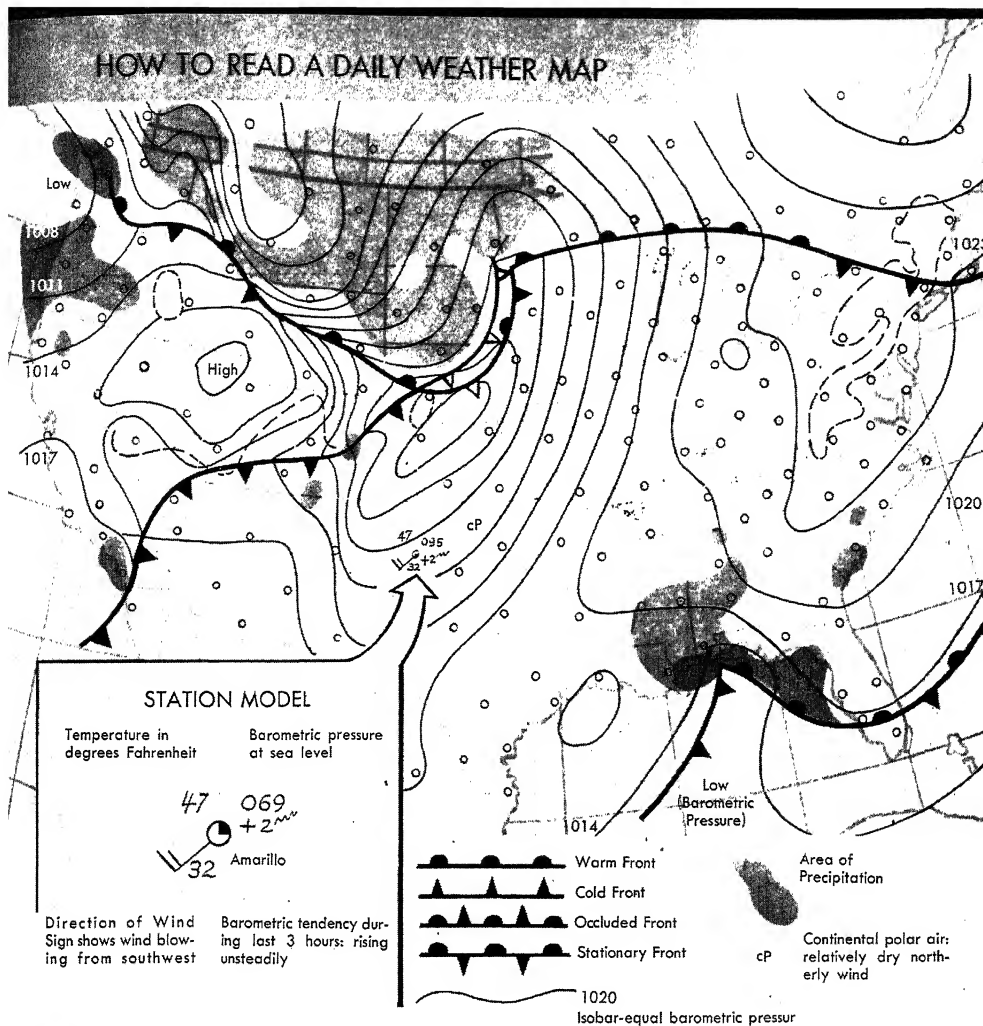
The red *warm front* shows where a warm air mass is being forced up over cold air. Ahead of the warm front there is usually rising temperature with rain or snow which stops after the front passes.

The purple *occluded front* shows where two cold or cool air masses are in contact, where all of the warm air has been lifted above the ground.

When a front does not move it is called a *stationary front*.

When a cold or occluded front passes there is usually a noticeable change of weather followed by a day or two of weather characteristic of the new air mass. As a

HOW TO READ A DAILY WEATHER MAP



Reports from all weather stations are marked on the daily weather map. The report above shows the various readings at Amarillo, Tex. Only four symbols are shown here, but the actual map may have as many as 20, to cover all conditions.

Weather data is taken at stations throughout the country at a certain time every day. This data is recorded on the weather map with figures and symbols of which only a few are shown here. Fronts, marked by heavy lines, separate air masses of different characteristics. Positions of the symbols on the lines indicate direction of air movement. Dots represent the weather stations. By compiling and analyzing the data, skilled meteorologists can forecast future weather

warm front passes there is a change of weather but there often is a cold front and another change of weather not far away. The prediction is based chiefly on wind and pressure in the lows and highs, the upper air reports, and also the changes in pressure since the previous map.

Next the *isobars* (lines of equal sea-level pressure) are drawn around the highs and lows and through the fronts. The average pressure at sea level is a little more than 1,000 millibars. Each isobar is drawn through points which have the same pressure. For example, one line is drawn through all points with pressure 1,020

millibars, another line for 1,023 millibars, etc., the lines being spaced by a difference of 3 millibars. Shaded areas show where precipitation is falling at the time of the observation. The sample map above does not show the data entered around each station circle because this map is too small to carry all the details found on the large maps used by the forecasters.

The circle with its entries for each station is called the *station model*. The wind direction arrow extends from the station circle *toward* the direction *from which* the wind blows. Feathers on the shaft of the arrow show

the force of the wind, on a scale from 1 to 12. Each full feather is two units of force and each half feather one unit of force. In the sample station model (page 8683) the wind is from the northwest, force 5. To save space and make the map easy for the forecaster to read at a glance, symbols are used for clouds and other elements.

Isotherms are lines of equal temperature. Only two isotherms are drawn; one through points where the temperature is at freezing (32°F) and another through points where the temperature is zero. All temperatures are entered at the station circles to help in the analysis.

The kind of air mass is shown by two or three letters which have the following meanings: M=maritime or air from the ocean; C=continental air; A=arctic; P=polar; T=tropical; E=equatorial; S=very dry air aloft; K=colder and W=warm than the surface over which the air is moving. These letters give the results of the analysis.

In addition to the main surface map, the forecaster has many special maps of the upper air and other charts and diagrams to study.

tion cover very short periods in advance, usually twelve hours or less. These forecasts are correct in their general features about 95 per cent of the time. Forecasts a day ahead show an accuracy of 85 per cent to 90 per cent. The accuracy becomes less as the time takes in more of the future. Detailed forecasts five days in advance are little better than chance. However, general forecasts of temperature and precipitation are somewhat better than chance on the fifth day, and are used extensively to estimate fuel consumption, to provide shippers of perishable goods with advance weather probabilities, and for many other special purposes.

Warnings of storms, cold waves, and other severe conditions have become entirely dependable in recent years. The first indications a day or two in advance are followed by frequent bulletins and warnings by radio and press as severe weather approaches, and the people are fully informed. Occasionally a storm or cold wave fails to affect *all* the area which has been warned. It is quite rare that a severe condition comes to any area without advance warning.

Accuracy of the Weather Forecast

Because of the speed of airplanes, forecasts for avia-

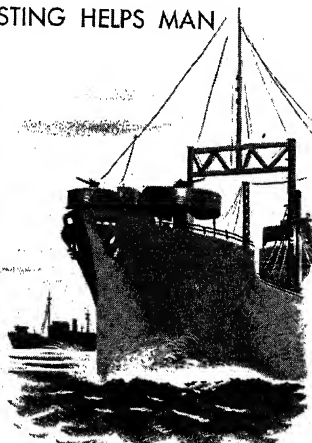
Weather Forecasting as a Hobby

Any person who makes a careful study of the weather

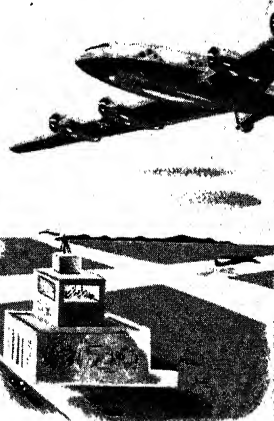
HOW WEATHER FORECASTING HELPS MAN



Daily Weather Information...



Aids sea and air navigation



Prevents crop ruin by cold-weather warnings



Helps in the planning of our daily lives



Gives vital aid to military planning

Wind Direction	Barometer Reduced to Sea Level	Character of Weather Indicated
SW to NW	30.10 to 30.20 and steady.....	Fair, with slight temperature changes, for 1 to 2 days.
SW to NW	30.10 to 30.20 and rising rapidly...	Fair, followed within 2 days by rain.
SW to NW	30.20 and above and stationary...	Continued fair, with no decided temperature change.
SW to NW	30.20 and above and falling slowly...	Slowly rising temperature and fair for 2 days.
S to SE	30.10 to 30.20 and falling slowly...	Rain within 24 hours.
S to SE	30.10 to 30.20 and falling rapidly...	Wind increasing in force, with rain within 12 to 24 hours.
SE to NE	30.10 to .20 and falling slowly.....	Rain in 12 to 18 hours.
SE to NE	30.10 to 30.20 and falling rapidly...	Increasing wind, and rain within 12 hours.
E to NE	30.10 and above and falling slowly...	In summer, with light winds, rain may not fall for several days. In winter, rain within 24 hours.
E to NE	30.10 and above and falling rapidly	In summer, rain probable within 12 to 24 hours. In winter, rain or snow, with increasing winds, will often set in when the barometer begins to fall and the wind sets in from the NE.
SE to NE	30.00 or below and falling slowly....	Rain will continue 1 to 2 days.
SE to NE	30.00 or below and falling rapidly...	Rain, with high wind, followed, within 36 hours, by clearing, and in winter by colder.
S to SW	30.00 or below and rising slowly....	Clearing within a few hours, and fair for several days.
S to E	29.80 or below and falling rapidly...	Severe storm imminent, followed, within 24 hours, by clearing, and in winter by colder.
E to N	29.80 or below and falling rapidly...	Severe northeast gale and heavy precipitation; in winter, heavy snow, followed by a cold wave.
Going to W	29.80 or below and rising rapidly...	Clearing and colder.

he observes locally, especially if he keeps a written record, will have some success in predicting the local weather. This method, however, is not nearly so good as the use of a weather map.

He should keep a good thermometer in a shaded place where the outside air circulates freely and where there is no effect from artificial heat. The inside of a porch post on the north side of a building is a good place. He can judge the wind direction and force by watching the effect of the wind on smoke, flags, trees, and other objects.

A good barometer is desirable. Its readings should be noted and compared with the readings for near-by points published by the Weather Bureau in the daily newspapers.

If the amateur weather forecaster watches the clouds and makes note of the changes with certain types of weather, and studies barometer and wind changes that come with them, he will by experience learn much that will be useful.

A good set of rules for storms is as follows:

When the wind sets in from points between south and southeast and the barometer falls steadily, a storm is approaching from the west or northwest, and its center will pass near or to the northward within 12 to 24 hours, with wind shifting to northwest by way of south and southwest. When the wind sets in from points between east and northeast and the barometer falls steadily, a storm is approaching from the south and southwest, and its center will pass near or to the southward within 12 to 24 hours, with wind shifting to northwest by way of north. The rapidity of the storm's approach and its intensity will be indicated by the rate and the amount of the fall in the barometer.

The wind indications in relation to barometer readings are summarized above.

Vocational Opportunities

The position of forecaster in the Weather Bureau is filled in either of two ways. (1) An elementary examination leads to appointment as junior weather observer.

After a period of time and experience, the employee earns promotion and may show promise as a weather forecaster. He may then be assigned as a forecaster in training where he has opportunity to qualify for full forecast duty. (2) With college training in weather analysis and forecasting, the applicant may take a professional examination for immediate assignment as a forecaster in training if such a position is open. Thereafter his promotion will depend on his ability as a forecaster. In any case these positions are in the Civil Service with grades and pay generally equal to similar positions in other technical and scientific bureaus and offices of the government. Information as to examinations, requirements and salaries, may be obtained from the United States Civil Service Commission, Washington 25, D.C.

Forecasting positions usually offer good prospects in regard to salary and responsibility. Any weather bureau employee may eventually qualify for certain key positions in administrative, scientific, and research branches of the work.

There are also commercial positions such as that of meteorologist for one of the airline companies, or for one of the other private organizations whose operations are so much affected by the weather as to require almost constant special attention. I.R.T.

Related Subjects. The reader is also referred to: Anemometer Meteorology (with list)
 Balloon (Other Scientific Storm (with list)
 Uses) Thermometer
 Barometer Weather (with list)
 Cloud Weather Bureau, United
 Hygrometer States
 Kite Wind (with list)

WEATHERING. See GEOLOGY (Weathering Destroys Rock); SOIL (How Soil Is Made [Water]).

WEATHERLY, FREDERIC EDWARD. See LONDON-DERRY AIR.

WEATHER MAP. See WEATHER BUREAU, UNITED STATES.

WEATHER VANE is a device which turns freely on an

upright rod and points in the direction from which wind comes. It is also called a *wind vane* or *weathercock*. The weather vane is one of the oldest weather instruments and is often ornamental in shape.

The part of the vane which turns into the wind is usually in the shape of an arrow. The other end is wide, so it will catch the smallest breeze. The breeze turns the arrow until it catches both sides of the wide end equally. Thus, the arrow always points directly into the wind. Below the arrow is a round plate on which the directions are marked. Modern vanes used by weather bureaus have electrical connections so that their direction is recorded in a room far from the vane itself. J.V.F.

WEAVERBIRD. The weaverbird is given this name because of the way it weaves its nest together. There are about 275 different kinds of weaverbirds. They live in the Philippines, in southern Asia, in Australia, and in Africa, and one species lives in many parts of the world. They are small, and resemble the finches. The weaverbirds eat seeds. They usually gather together in large flocks. These flocks eat growing rice and other grains. Weaverbirds cannot sing very well, but they keep up a continual chirping and chattering. The females and immature birds are generally plain-colored, but the males are brightly colored during the mating season. Many of the weaverbirds are kept as cage birds.

The *social* weaverbirds of the interior of South Africa build a community roof of grasses, often as large as a native hut. The underside of the roof is divided into compartments. Each compartment is occupied by a pair of birds. Young birds add their nests to the parent building. As many as 320 individual nests have been counted under one umbrella-shaped roof in a tree. The social weaverbird's eggs are dull in color, and speckled with purple-gray. The female lays three or four of them in the nest.

The *olive and yellow* weaverbird also lives in South Africa. It weaves a bowl-shaped nest from the leaves of reeds. These leaves are torn into strips. The nest is hung

from the branch of a tree or from rushes, and opens downward. A bar across the opening keeps the two or three green eggs from rolling out. The *Java sparrow* is another weaverbird, frequently kept in captivity, that uses grasses for weaving its nest. The opening of this bird's nest is on the side. The six or more eggs are pure white in color. The *baya* is a weaverbird found in India or Ceylon. It builds a flask-shaped nest with a long, tubular entrance. This nest is hung from thorny branches or the tips of palm leaves. The familiar house or English sparrow, which builds a bulky nest with the opening on one side in a tree or in a crevice about buildings, belongs to the weaverbird family.

A.A.A.

See also BIRD (Foster Parents in the Bird World; color plate, Favorite Bird Pets [Java Sparrow]; illustration, Unusual Nests).

Classification. The various species of weaverbirds belong to the family *Ploceidae*.

WEAVING. Man was a weaver as early as the New Stone Age. He had learned to make a rough kind of clothing from the fibers of the flax plant. The making of linen cloth had become a fine art by the time of the ancient Egyptians. About 2,000 B.C., the Chinese discovered how to unwind the threads of silkworm cocoons and weave them into cloth. At about the same time, the people of India found out how to make cloth from the fibers of the cotton plant. In ancient Greece and Rome the weaving of silk, wool, linen, and cotton cloth had been highly developed. Weaving had become more than a simple interlacing of lengthwise and crosswise threads. Men had figured out ways to cross the different threads so as to make beautiful patterns in the material. Colorful and intricate tapestries were woven in Persia and India.

During the Middle Ages and the Renaissance, people wove cloth in their homes on awkward hand looms. Mothers wove the cloth and made the clothing for all the members of the family. Late in the 1700's, a machine called the spinning jenny was invented. It could make thread from plant and animal fibers. A few years later the power loom, a mechanical device for weaving, was developed. Within the next 150 years, weaving became a factory operation. In the United States the industry grew rapidly. Today the yearly value of its products is more than \$2,000,000,000.

How Cloth Is Woven

Loose strands of yarn are made into cloth in much the same way that we darn a sock. That is, a group of lengthwise threads are arranged in rows very close together. Crosswise threads are then laced over and under the lengthwise threads. The ancient weavers strung the lengthwise threads on a frame, and laced the crosswise threads in by using a shuttle somewhat like a large needle. They raised and lowered the lengthwise threads by hand, to allow the shuttle to go under and over them. Later, a device called the harness was invented to raise and lower the lengthwise threads automatically.

Today, the entire weaving process is done by machine. The harness, shuttles, and other weaving devices work automatically. Power looms of today require few human workers. The loom of tomorrow may work without yarn itself, making cloth directly from the liquid



The Weaverbird builds an elaborate hanging nest by skillfully weaving the fibers of plants together.



Ewing Galloway; Douglas Gendreau

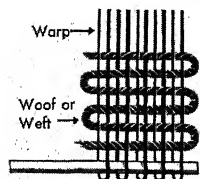
Students Demonstrate Oriental Weaving on a Hand Loom

substance, somewhat as a waffle iron makes waffles. Nets and other thin textiles have been made by this process.

The Basic Weaves

All weaving has three basic forms, the plain weave, the satin weave, and the twill weave.

Plain Weave. Many of our cottons and linens are woven in plain weave. The lengthwise, or *warp*, threads are set evenly on the frame. The shuttle carrying the crosswise, or *weft*, threads goes over one warp, then under the next, then over, and so on until the material is woven. Some of the plain-weave cloths are gingham, percale, chambray, table linen, shantung, woolen, tweed, and voile.



Arrangement of warp and weft threads in the plain weave

Twill Weave is made by crossing of the lengthwise threads by the crosswise threads in an irregular way, so that the finished cloth has rows of diagonally raised lines. Gabardine, covert cloth, twill, and many other of our common cloths are twill-woven. The very tightly drawn threads in this weave give longer wear to the cloth.

The number of warp yarns which are taken in at each crossing of the weft yarns varies with different twills, but the principle is the same in all. For example, to make gabardine, the first set of weft yarns cross one warp yarn, then go under two, over one, and repeat on to the end of the row. The next set of weft yarns, however, crosses two lengthwise yarns, then goes under two, over one, and so on to the end of the row.

Satin Weave is really a broken twill. Instead of progressing one warp yarn at the beginning of each new crossing of the weft yarns, it progresses two. The material gets its smooth appearance on one side because the many warp yarns hide the weft yarns.

E. C. BAI.

See also ASIA (color plate, Turkish Rug Weaver);

A Single Workman Can Attend Several Power Looms

CARTWRIGHT, EDMUND; HOBBY (Books about Hobbies); INDIAN, AMERICAN (color plate, Navaho Woman Weaving Rug); JACQUARD, JOSEPH M.; LATIN AMERICA (color plate, Guatemalan Indian Woman Weaving); SATIN; TWILL.

WEB, SPIDER. See SPIDER.

WEBB-KENYON LAW. See PROHIBITION (In the United States).

WEBB-POMERENE ACT. This bill modified the Sherman Anti-Trust Act by allowing corporations to form business combinations (trusts) for foreign-trade purposes. It was passed by the United States Congress in 1918. See CARTEL.

WEBER, FAYT ber, KARL MARIA FRIEDRICH ERNST, BARON VON (1786-1826), was a German composer. He founded the Romantic school of opera, of which Richard Wagner became the leader. Weber was born at Eutin, in Oldenburg. He studied music first with his father, and then with Michael Haydn, younger brother of Joseph Haydn.

When Weber was eighteen years old, he became conductor of the opera in Breslau. In 1813 he was appointed director of the Praha Opera, and three years later became conductor of the German Opera at Dresden. In 1819 he wrote "Invitation to the Dance," perhaps his most famous piano composition. It became a model of waltz writing that was effectively used by the Johann Strausses, father and son. Between 1821 and 1826 Weber wrote the three operas upon which his fame rests. *Der Freischütz* was the first romantic German opera. *Eury-anthe* was the inspiration for Wagner's *Lohengrin*. In spite of ill health, Weber supervised the production of *Oberon* in London, where he died three weeks later. G.B.

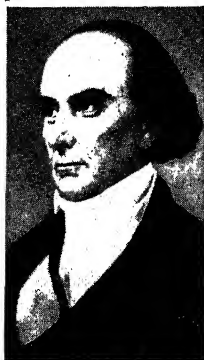
His Works include "Konzertstück für Piano, in F minor"; "Sonata, No. 1 in C major," "Grande Polonaise in E flat," both for piano; two symphonies; and numerous cantatas and songs.

WEBER RIVER. See UTAH (Rivers and Lakes).

WEBSTER, DANIEL (1782-1852), was one of the best-known statesmen and orators in American history. His fame as an orator was so great that Webster has become

a part of American legend. Many stories have been written about his ability to hold an audience spellbound with his words.

As a statesman, Webster was a champion of the Union, the Constitution, and the rising industrial interests of the North. In the years before the War between the States, the Union was often near the point of breaking up. Webster, more than any other man, held it together. His main concern was passing a tariff act to protect the industry of the North, but this issue was always connected with the doctrine of nullification, or the right of a state to refuse to accept a law which it did not favor. The South was against a protective tariff and threatened to nullify the tariff if it were passed. Webster became the champion of the Constitution in order to overcome this doctrine, which would destroy not only the industrial interests but also the Union. Webster's farseeing statesmanship was never fully rewarded. The highest office he ever held was Secretary of State, while less able men held the Presidency of the United States.



Brown Bros.

Daniel Webster, one of the most prominent statesmen in American history

Young Lawyer. Webster was born in Salisbury (now Franklin), N.H. His father was a pioneer who fought in the French and Indian War and the Revolutionary War and later was prominent in state politics. At the age of nineteen, young Webster was graduated from Dartmouth College, and began to study law. In 1805 he was admitted to the bar in Boston, but his father's illness caused him to return home to practice. In 1807, after his father's death, he settled in Portsmouth, N.H., where he became a well-known lawyer.

Webster became interested in politics and often spoke in favor of the shipping interests of New England. He opposed the embargo and nonimportation acts which ruined New England commerce and spoke out against the War of 1812, which he called "unjustifiable." Webster became one of the leaders in the Federalist party in New Hampshire. In 1812 he was elected to the House of Representatives. In May, 1813, he took his seat in the House and immediately took an active part in the nation's affairs. Henry Clay, who was then Speaker of the House, made him a member of the Committee on Foreign Relations. Webster continued to oppose the war, refused to vote for war taxes, and spoke against the drafting of soldiers. In 1816 he moved to Boston and built up a profitable law practice. When his term ended in 1817 he retired from politics.

Able Counselor. Webster became widely known as a constitutional lawyer and was one of the counsel for Dartmouth College in its famous case against the New Hampshire legislature. He brought the suit before the United States Supreme Court and won the case by a powerful plea. In those years of private practice Web-

ster made many of the famous speeches on which his fame as an orator rests.

Career in the Senate. In 1822 Webster was elected to Congress as a representative from Boston, and served in the House until 1827. In that year he began his long and famous career in the Senate. In 1828 the South opposed the so-called "Tariff of Abominations," and threatened to nullify it. Senator Robert Y. Hayne of South Carolina made a brilliant defense of nullification in 1830 and Webster answered him with his famous speech in defense of the Constitution. It ended, "Liberty and Union, now and forever, one and inseparable!" This oration probably did more to unify the country than any other speech of the time.

Andrew Jackson was then President of the United States, and both parties in Congress opposed his attitude on the United States Bank and other matters. The Whig party was formed to oppose Jackson, and Webster became one of its leaders. In 1840 the Whig candidate, William Henry Harrison, was elected President and he appointed Webster his Secretary of State. When Harrison died a month later, John Tyler, a Democrat, followed him as President and the Whigs asked Webster to resign. But Webster was involved in the negotiations over the Maine boundary with England and remained in office until he had completed the Webster-Ashburton Treaty. He resigned in May, 1843, and two years later re-entered the Senate.

Webster was against the extension of slave territory and opposed the adding of Texas to the Union and the war with Mexico. The country seemed to be about to divide on the issue of slavery. The antislavery forces wanted to keep slavery out of the new territories, and the Southern leaders were ready to separate from the Union to protect their interests. Webster had dealt successfully with the issue of nullification, and the North looked to him again for leadership. But Webster disappointed the North by making a speech in favor of Clay's Compromise of 1850. In it he offered to give the South some of the things it wanted.

Later Years. Webster never got back his popularity, and his career soon ended. Soon after his speech he became Secretary of State in President Millard Fillmore's Cabinet. In this position he wrote the famous "Hulsemann letter." It championed Lajos Kossuth, the Hungarian patriot who had attempted to set up a republic in his native land. Webster wrote the Austrian government that the United States would favor "responsible and popular government in any part of the world." This was his last important public act. In 1852 he tried to gain the Whig nomination for President of the United States, but was unsuccessful. The great "Defender of the Constitution" died soon afterward at Marshfield, Mass. In 1894 New Hampshire placed his statue in Statuary Hall.

W.B.H.

Related Subjects. The reader is also referred to:
 Ashburton, Alexander Hayne, Robert Young
 Baring, Lord Kossuth, Lajos
 Ball, Thomas Nullification
 Compromise of 1850 Statuary Hall
 Dartmouth College Webster-Ashburton Treaty

WEBSTER, HAROLD TUCKER. See CARTOON (Leading Cartoonists).

WEBSTER, HENRY KITCHELL

WEBSTER, HENRY KITCHELL (1875-1932), wrote novels of American life, and many mystery stories. He was born in Evanston, Ill.

WEBSTER, NOAH (1758-1843), was an American educator and journalist who wrote *Webster's Dictionary*. This work was the finest English dictionary of its time. Today, in its latest revised and enlarged form, *Webster's New International Dictionary*, it is used by all Federal and state courts as the final authority on the meaning of words.

Webster was born in Hartford, Conn. He was a descendant of John Webster, one-time governor of Connecticut, and Governor William Bradford of the Plymouth Colony. Webster attended Yale College, but was graduated in the middle of his course after serving as a volunteer in the Revolutionary War. He studied law and was admitted to the bar in 1781, but decided to teach school instead. In 1782, while teaching in Goshen, N.Y., he began to write his *Grammatical Institute of the English Language*. It was made up of a speller, a grammar, and a reader written for the use of school children. The first part of this work, *Webster's Spelling Book*, or *Blue-Backed Speller*, was very popular and had a wide sale for more than 100 years.

During the critical period after the Revolutionary War, Webster joined the Federalist party and wrote many articles and pamphlets on political topics. In 1787 he became editor of *The American Magazine*. When that publication failed, he became editor of two Federalist newspapers.

In 1806 Webster brought out *A Compendious Dictionary of the English Language*, which was somewhat like an encyclopedia. The following year he began the great work of his life, his *American Dictionary of the English Language*. This work included twelve thousand words and forty thousand definitions that had never before appeared in a dictionary. The first edition came out in 1828, and in 1840 Webster published an enlarged edition. After his death his heirs sold the rights to the dictionary to the G. and C. Merriam Company of Springfield, Mass.

See also **DICTIONARY**.

WEBSTER, RICHARD EVERARD. See **ALVERSTONE, RICHARD EVERARD WEBSTER**.

• **WEBSTER-ASHBURTON TREATY.** Representatives of the United States and Great Britain signed the Webster-Ashburton Treaty at Washington, D.C., in August, 1842. The signers were Secretary of State Daniel Webster, for the United States, and Lord Ashburton, for Great Britain.

The agreement settled a number of annoying disputes between the two countries. Most important was the fixing of the boundary line between Canada and the state of Maine. The United States received more than half of the disputed area of 12,000 square miles.



Brown Bros.

Noah Webster laid the groundwork for modern English dictionaries.

WEDGE

Other boundary disputes of a minor nature were settled, and a clause of the treaty provided for the mutual extradition of criminals. The negotiations also provided opportunity for the peaceful discussion of problems arising from British efforts to suppress the African slave trade. The Webster-Ashburton Treaty was one of the many instances in which the United States and Great Britain settled disputes without going to war. J.D.H.

See also **ASHBURTON, ALEXANDER B.**, **LORD; WEBSTER, DANIEL**.

WEBSTER COLLEGE is a college for women at Webster Groves, Mo. It is conducted by the Sisters of Loretto at the Foot of the Cross. Webster College was founded in 1915. It is affiliated with St. Louis University. Courses lead to the bachelor's degrees in arts, science, and music. Average enrollment is about 230.

WEDDING. See **MARRIAGE** (Marriage Customs).

WEDDING ANNIVERSARY. The yearly anniversary of the day two persons were married is often an occasion for celebration and gift giving. The peoples of many lands celebrate wedding anniversaries according to their own customs and traditions. In the United States, each anniversary gradually came to have a name of its own. These names were based on the gifts persons gave to mark the end of that particular year of married life. Today wedding anniversaries are often celebrated without regard for the name or gift that was once thought appropriate. But many persons still cling to the old custom of giving a certain type of gift on each anniversary.

Certain anniversaries and the type of gifts which mark their celebration are listed below.

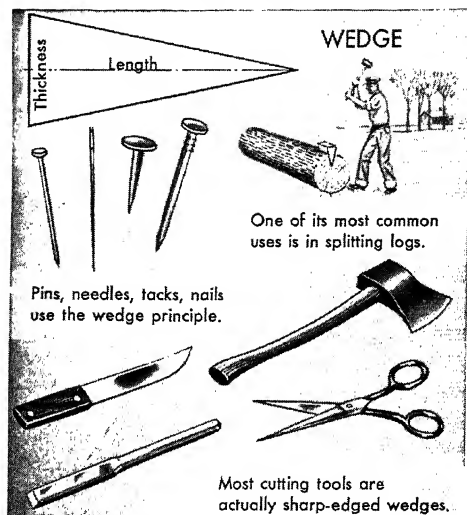
First	Paper
Second	Cotton or straw
Third	Leather
Fourth	Fruit, flowers, or books
Fifth	Wooden
Sixth	Candy
Seventh	Woolen
Eighth	Pottery or bronze
Ninth	Willow or straw
Tenth	Tin
Twelfth	Silk and fine linen
Fifteenth	Crystal
Twentieth	China
Twenty-fifth	Silver
Thirtieth	Pearl
Fortieth	Ruby or emerald
Fiftieth	Golden
Sixtieth, Seventieth, or Seventy-fifth	Diamond

M.F.L.

WEDDING DANCE. See **BRUGHEL** (Pieter the Elder); **PAINTING** (color plate, Great European Paintings).

WEDDING RING. See **RING**.

WEDGE. A wedge is a type of simple machine that has two or more slanted, or inclined, planes which taper to a thin edge or point. Wedges are used in piercing or splitting heavy objects. The wedge may be made of wood or metal. For example, nails, pins, and needles are all wedges because they are used to push or drive through an object. Cutting tools, such as knives and scissors, are also types of wedges. Wooden wedges are often used in splitting logs and rails. Effort is applied to the wedge by a heavy blow from a tool such as an ax. As the wedge cuts through, it meets with a great deal of resistance due to friction. For this reason, there is no



mathematical formula for determining the mechanical advantage of the wedge. It is known only that the longer the wedge in proportion to its thickness, the easier it is to drive the wedge through a resisting body. Wedges are also used to push or lift heavy loads. The smaller the angle formed by the two inclined planes, the easier it is to push the load. See also **INCLINED PLANE**. R.F.P.

WEDGWOOD, JOSIAH (1730-1795), was an English pottery maker who developed his craft into an art. The chinaware which he made is much prized by collectors today. Wedgwood was born in Staffordshire, a district which is rich in pottery-making clay. For a time he was a partner of Thomas Wheildon, a master potter. Later he opened his own pottery. Wedgwood invented new tools and ovens and trained his workmen in new methods. He also developed roads and canals to carry his goods safely. In 1770 he built at Hanley his great Etruria works where his descendants continued to manufacture his pottery. See also **WEDGWOOD WARE**. C.M.H.A.

WEDGWOOD WARE is a beautiful, high-grade chinaware that was made by England's most famous potter, Josiah Wedgwood. His first experiments resulted in the creation of *Queen's Ware*, in 1762, in honor of Queen Charlotte, wife of George III. Later important classes of Wedgwood ware were Egyptian black, or *basalts*, used for medallion portraits, vases, busts, seals, and similar objects; red ware, or *Rosso antico*, used for cameo reliefs; *white semiporcelain*, or fine stoneware, with a beautiful, smooth surface; and *jasper*, the final product of the great potter.

For jasper, Wedgwood used white, various tints of blue, lilac, pink, sage green, olive green, yellow, and black. Objects made of this ware include medallions, cameos, statuettes, pedestals, flowerpots, and vases. Figures in relief, or with a raised design, represented classical art, and adorned many objects made from jasper. Famous artists made the designs. White cameo reliefs on a blue background proved very popular and have



Wedgwood Jasper Vase with Greek Design



Wedgwood Dinnerware with the Famous Raised Grape Design

Josiah Wedgwood & Sons, Inc.

been used in many inexpensive copies. One of the most famous of the Wedgwood creations is a copy of the celebrated Portland vase.

C.M.H.A.

See also WEDGWOOD, JOSIAH.

WEDNESDAY, *WENȝdih*, is the English name for the fourth day of the week. This day gets its name from Woden, or Odin, the chief god in Norse mythology, to whom it was once considered sacred. At the beginning of the Christian Era, this day was known as Woden's-day. Its name was later changed to *Wednesday*. The first people to name the days of the week after gods in mythology were the ancient Romans. They called the fourth day of the week after the god Mercury. From this, the French named it *mercredi*.

G.HUM.

See also ASH WEDNESDAY; WEEK.

WEED. A weed is a plant that is troublesome and worthless in the place where it is growing. Experts of the United States Department of Agriculture have estimated that the yearly loss to farm crops caused by weeds is about \$5 for every person in the country.

The dividing line between weeds and useful plants is not found in the plants themselves, but in the way men use them. For example, oats growing in a cornfield would be weeds, but oats are useful plants in an oatfield. Grass grows in almost every plowed field, and gets in the way of the crop. In a place like this, grass is a weed. But grass may be a very valuable crop in a hayfield or pasture, and on lawns and golf courses it is beautiful and desirable.

Some Common Weeds

<i>Annuals</i>	<i>Biennials</i>	<i>Perennials</i>
Amaranth	Bull thistle	Bindweed
Chess, a brome grass (See BROME GRASS)	(See THISTLE) Burdock	Canada thistle
Cocklebur	Mullein	Dandelion
Crab grass	Poison hemlock	Milkweed
(See GRASS)	(See HEMLOCK)	Poison Ivy
Foxtail grass	Teasel	Quack grass
(See GRASS)	Wild carrot	(See GRASS)
Jimson weed	Wild parsnip	[Couch Grass]
Pigweed	(See PARSNIP)	Selfheal
Purslane		Sheep sorrel
Ragweed		(See SORREL)
Wild Mustard		Toadflax
		Yarrow

Kinds of Weeds. Weeds may be divided into three classes. The *annuals* live only one year. *Biennials* live two years, or two growing seasons. The *perennials* are weeds that live longer than two years.

Annuals grow new plants entirely by seeds. They should be destroyed before the seeds are ripe. Most annual weeds produce a large number of seeds. A single plant often bears many thousands of them. The farmer who plows under seed-bearing weeds is preparing a large crop of weeds for the next season. The seeds of some of these plants will live underground for many years, ready to sprout when the conditions are right. Deep plowing to kill these seeds only helps them sprout, and the second plowing is followed by a crop of weeds.

The biennials are strong in root as well as seeds. A good example of a biennial is the bull thistle, or purple thistle. The young plant begins to grow in the spring, and the following season it produces a stalk three or four

feet high. This stalk bears thousands of seeds. The young plants should be destroyed as soon as they appear. They will not die unless they are cut off beneath the surface deep enough to destroy the roots.

The perennials are the most troublesome weeds of all. They have spreading roots or underground stems which keep producing new plants. These plants also produce many seeds. Some of the worst perennial weeds are Canada thistle, bindweed or morning-glory, couch grass or quack grass, sorrel, perennial sow thistle, and leafy spurge. The way to control these weeds is to keep the stalks from growing, so the roots can get no nourishment for two or three seasons. Then the roots die, and the weed is destroyed. One way to do this is to turn the land into pasture. A farmer who grows crops on land that has many weed roots in the ground may merely increase the number of weeds. Each section of the root grows a new plant.

One of the best ways to fight weeds is to cultivate the ground early and constantly. Another is to burn over weedy ground before plowing. Still another method is to mow roadsides, vacant lots, and all other uncultivated lands before the weed seeds ripen. The United States Department of Agriculture will send helpful bulletins on weeds to anyone who asks for them.

Herbicides. A herbicide is a chemical used to destroy weeds and other undesirable plants. Some chemicals can be sprayed over a crop to kill the weeds without injuring the crop plants permanently. These herbicides are called *selective sprays*. The most useful ones are sulfuric acid, copper sulfate, iron sulfate, sinox, and 2,4-D. Other successful herbicides are common salt (sodium chloride), crude oil, kerosene, and compounds of arsenic.

Poison sprays work better against annual weeds than plants with stubborn underground parts. For information about kinds of herbicides, the amounts to use, and different methods, write to a state agricultural experiment station, or the United States Department of Agriculture.

W.C.M.

Related Subjects. The reader is also referred to the weeds listed in the table "Some Common Weeds" and to the following:

Flower (color plate, Flowers of Plants Harmful to Man and Animal)

Gardening (Cultivating the Soil)

Weed Killer

WEEDS

Compass Plant	Lupine
Dock	Nettle
Dodder	Plantain
Glasswort	Poison Ivy
Goldenrod	Poison Oak
Gromwell	Pokeweed
Henbane	Saint-John's-Wort
Horsetail	Smartweed
Indian Mallow	Sow Thistle
Knotgrass, Knotweed,	Stickseed
or Doormat	Tumbleweed
Lamb's-Quarters	Viper's Bugloss
Locoweed	Water Hyacinth

WEED, THURLOW (1797-1882), was an American journalist and political leader. He was one of the leaders of the Whig and Republican parties and was largely responsible for the election of the two Whig Presidents, William Henry Harrison and Zachary Taylor. He was

born in Cairo, N.Y., and became a printer. In 1830 he established the Albany (N.Y.) *Evening Journal* and used its influence to become one of the political leaders of New York. E.S.W.

WEED KILLER. The gardener or farmer may make use of several methods for killing weeds—chemicals, heat, machines, or hand weeding: A chemical that kills weeds is a *herbicide*. Some herbicides, called soil sterilants, keep anything from growing in the soil. They are used when there are many weeds with roots deep in the soil. This type includes many salts, like common salt, borax, and sodium arsenite. Plants cannot grow in treated soil until the rain has washed out the chemical.

Sprays for killing weeds have been known since the late 1800's. One spray that has long been used is a solution of iron sulfate, made from two pounds of the chemical to a gallon of water. Dilute sulfuric acid will kill most weeds, except upright or waxy ones. It is most useful on large areas, like farms. Sodium or calcium chlorate can be used as a spray or a dusting powder. It works best on weeds with rather large leaves, and should be applied when they are moist. Substances like kerosene and cleaning fluid make strong sprays. Some oils kill all plants. Others will not harm carrots, celery and parsley, and have been used to weed these crops.

A yellow coal-tar dye known as *sinox* kills only annual weeds with broad leaves, and does not harm grass. It also destroys pollen and insects. Some weeds can resist the chemical as they grow older. Sinox has been sprayed from trucks and airplanes. It has been used with crops of grain, flax, peas, and potatoes.

Sodium sulfamate is good for fighting poison ivy and chokecherry.

In 1944 there were reports of two new weed-killing plant hormones, known as 2,4-D and 2,4,5-T. They stand for the chemical names 2,4-dichlorophenoxyacetic acid, and 2,4,5-trichlorophenoxyacetic acid. Hormones kill plants by working them to death. They speed up the growth of the plants until they die. The 2,4-D kills most plants except the grasses. That is, its action is selective. This makes it useful on lawns, golf courses, and pastures, and with corn and sugar cane. It should not be used on flowers. The 2,4-D can also be mixed in the soil to kill the weed seeds before planting other seeds. It disappears after a few months and does not ruin the soil. It also keeps ragweed from shedding the pollen that causes hay fever. This hormone has not harmed farm animals, and does not pollute milk.

The hormones are active in much smaller amounts than other herbicides. About a pound can be used to spray 32 to 64 square rods. The same amount of some common chemicals would cover only $\frac{1}{3}$ square rod. The hormone can be used as spray, dust, or aerosol. Many experiments on other plant hormones are being made.

For killing weeds by heat, the farmer now has a machine called the Sizz-weeder. Flame weeding works when the crop has more fiber than the weed, and can resist the heat. W.C.BEA.

See also WEED.

WEEK. A week is a division of time which includes seven days. We do not know exactly how this man-made division of time came into being, but the ancient Hebrews were among the first to use it. To them, the

week sprang from the book of Genesis in the Bible, in which it is stated that the world was created in six days and the seventh day, or Sabbath was a day of rest and worship.

The ancient Egyptians named each day of the week for one of the planets. They considered the seventh day merely as a day of rest and play. Among the later Romans, the seven days of the week were named after the sun, moon, and five planets which were then known. Each day was considered sacred to the Roman god who was associated with that planet. The days were known as Sun's-day, Moon's-day, Mars'-day, and so on. This system was used about the beginning of the Christian Era. But it was not made official until Constantine became ruler. P.S.

Related Subjects. The reader is also referred to:

Friday	Thursday	Sunday
Monday	Saturday	Wednesday
Tuesday		

WEEMS, MASON LOCKE (1759-1825), was an Episcopal clergyman, bookseller, and writer. He is usually known as Parson Weems. He was born in Anne Arundel County, Maryland, and is believed to have studied in England. Weems was ordained in England in 1784 and returned to America to preach in Maryland until 1792. In 1791 he began to reprint morally uplifting books, and after 1792 he spent most of his time traveling through the colonies selling these publications. Probably the best known of his own writings is *The Life and Memorable Actions of George Washington*. This book is historically inaccurate and includes many tales which Weems apparently invented such as the story of Washington's chopping down the cherry tree. Weems also wrote biographies of Benjamin Franklin and William Penn, as well as many moralizing pamphlets. C.Ma.

WEEPING BIRCH. See BIRCH (Canoe Birch).

WEEVER. The weever is a salt-water fish that has poisonous spines. These fish are often dangerous to bathers, especially in the British Isles.

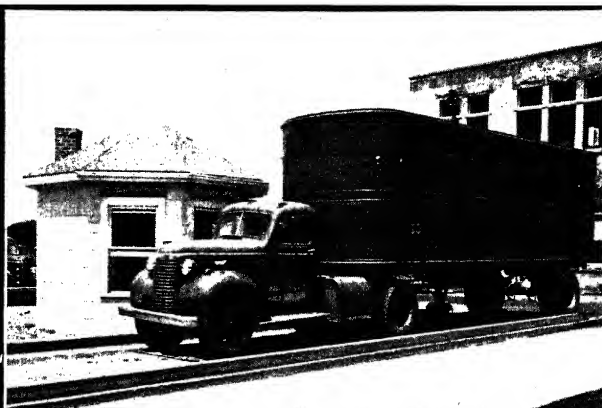
WEEVIL, WE v'l, is the name of several kinds of small beetles. They are among the worst insect pests that attack farm crops. The cotton boll weevil, commonly called the boll weevil, causes more loss than any other insect pest in the United States. The name weevil is also given to the grubs, or larvae, of these beetles. The larva is the form that does the damage.

Adult weevils are usually so small that they are hard to see. They each have a long snout, which is sometimes longer than the rest of the body. These insects lay their eggs in the stalk, seed, or fruit of the plant. The grub then feeds on it, causing great damage to the crop.

Beside the boll weevil, there are other kinds that attack grain, fruit, clover, and alfalfa. The *granary weevil* is very harmful to wheat. It lays its eggs on the wheat after it is stored, and grubs burrow into the grain.



The Alfalfa Weevil



Scales Have Been Built to Weigh Everything from Tiny Babies to Giant Trailer Trucks

Fairbanks-Morse & Co.

The *rice weevil* destroys rice and other cereals the same way. The *alfalfa weevil* first appeared in Salt Lake City about 1904. It has spread rapidly, and causes great loss in alfalfa-growing regions every year. This insect is less than a quarter inch long, and is tawny red. It was brought to the United States from Europe and Asia. In its native home it has many insect enemies which eat the weevil and its eggs, and keep it in check. The United States Department of Agriculture has imported large numbers of these parasites. It has tried spreading them among the weevils to keep down the damage to alfalfa.

There are also many kinds of fruit weevils. The *plum curculio* is the most important of the group that attack plums and cherries. The worms of these insects feed on the fruit, which falls off or becomes wormy and unfit to eat.

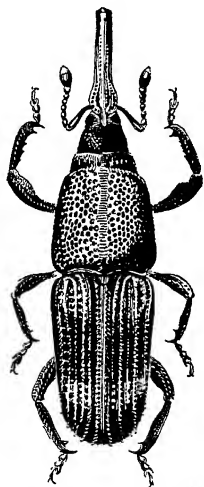
See also **BEEBLE**; **BOLL WEEVIL**; **GRAIN WEEVIL**.

Classification. Weevils are insects of the order *Coleoptera*.

WEFT, or **WOOF**. See **CLOTH**; **WEAVING**.

WEGENER, *VÄR geh ner*, **ALFRED LOTHAR** (1880-1930), was a German explorer and meteorologist. He is perhaps best known for his theory of continental drift. According to this theory, the continents were at one time all part of a single land mass, but in ages past they broke off and very slowly drifted apart.

Wegener was born at Innsbruck, Austria, and studied at the universities of Heidelberg and Berlin, where he specialized in astronomy. In 1906 he went as a meteorologist on his first expedition to Greenland with a Danish exploration party. He lost his life on his fourth journey into the frozen interior of Greenland. Wegener made many studies of Greenland. He also made many studies



The Rice Weevil destroys rice and other cereals.

R. O. Essig

G.P.

of the upper atmosphere and with his brother Kurt set a world's record for balloon flying by remaining in the air for fifty-two and a half hours.

J. Cor.

WEHRMACHT, *VÄTR mahkt*, was the term for all the German armed forces during World War II. The Wehrmacht included the German army, navy, and air forces, and special units such as the Landsturm and Landwehr. See also **LANDSTURM**; **LANDWEHR**.

R. Col.

WEIDMAN, CHARLES EDWARD (1901-). See **DANCING** (*Modern Dance*).

WEIGHING, *WÄ ing*, **SCALE** is a mechanical device for finding the weight of any substance. All types of weighing scales are based on the principles of balance. The principle is easy to understand if a horizontal bar is balanced at the top of a vertical bar so that it will tilt at an angle if touched. If a one-pound piece of iron is hung from each end of the balanced rod, the rod will not tilt. If two unequal weights are hung from the ends, the heavier one will pull its end of the rod down, and raise the lighter weight. Now suppose the horizontal bar were pivoted at a point to one side of the center. It would not be balanced. A heavier weight would be needed at the end of the shorter arm to raise the pound weight hung at the end of the long arm. This is the type of lever on which most scales are based.

The above description is of the *beam scale* or *balance*. It probably originated in ancient Egypt. Some scientists believe it was invented 5,000 years before the Christian Era. The earliest balances were of the cord-pivot type. The beam was hung at its center by a cord attached to a fixed support. Scale pans were hung by cords from the ends of the beam. The object to be weighed was placed on one scale pan. Known weights were placed on the other pan until the two hung in balance.

The *balance scale* is still commonly used in laboratories, for accurate weighing during experiments. It has been made very precise in its ability to weigh extremely light objects.

The Platform Scale is one of the more familiar weighing machines. The scales with which we take our own weight are largely of this type. It has a hinged platform, set within or above a fixed platform. A weight placed on the hinged platform will cause the platform to press on a lever underneath. The lever is connected with a rod which rises perpendicularly for a certain height (according to the size of the machine). This rod in turn is connected by a knife-edge joint to the short end of a hori-

WEIGHT

zontal lever, as in the accompanying diagram. The longer arm of the lever carries a movable counterweight. The arm is marked off into pounds.

The object being weighed presses down the lever under the platform. This pulls down the shorter end of the weighing lever and causes the longer arm with the weights to rise. A weight is moved along the lever until the lever is balanced exactly. The mark on the lever at the spot where the weight rests tells how many pounds the object on the platform weighs.

In some platform scales, a one-pound weight on the lever will balance ten pounds or 100 pounds on the platform. If the lever is made longer, the difference will increase until one pound on the lever balances, 1,000 pounds or more on the platform. Such a great difference is needed for weighing heavy objects like loaded wagons and trucks.

Other Weighing Machines. Some weighing machines are so large that they will correctly weigh monster locomotives. Others, used by scientists, are so delicately adjusted that a few words written on a piece of paper with a soft lead pencil can be weighed. Machines for weighing heavy guns in government arsenals may weigh more than 300,000 pounds. Spring scales can be made so strong that they will measure in tons the pull of the most powerful locomotive.

Retail stores now use a complicated balance scale for weighing groceries and such goods. These machines not only weigh the goods, but also figure the cost automatically. A pointer is set at the price per pound at which the goods are to be sold. The articles are then put on the scale. A lever shows the weight in the ordinary manner; the price is shown by a hand on a clocklike dial. In most small commercial scales, the platform or scale pan is placed above the lever.

E.A.Fe.

See also CALCULATING MACHINE (illustration).

WEIGHT is a measure of the amount of force with which a body is pulled toward the earth by gravity. To say that a body has a weight of five pounds, simply means that the earth pulls on it to that extent. The weight of a body is different from its mass, because mass remains the same, while the weight changes at different altitudes and at different places on the surface of the earth. The farther a body is from the center of the earth, the less will be the force of gravity and therefore the less weight it will have. Because the earth is flattened at the poles, a mass of iron which weighs 1,000 pounds at the equator will weigh five pounds more at the poles. The weight of a body decreases proportionately as the square of the distance of the body to the center of the earth. At the center of the earth, a body would have no weight at all, because it would be equally attracted in all directions. These differences in weight caused by difference in altitude and latitude have an important effect upon various sports records. A javelin, for example, can be thrown further near the equator than it can in Norway. See also GRAVITATION; WEIGHING SCALE.

R.F.P.

WEIGHT, ATOMIC. See ATOMIC WEIGHT.

WEIGHT, MOLECULAR. See MOLECULE (Molecular Weights).

WEIGHT, TABLES OF. For boys and girls, ages six to eighteen, see GROWTH. For average weights for men and women, see OVERWEIGHT.

WEIGHTS AND MEASURES



Schneider, Black Star

WEIGHT REDUCTION. See OVERWEIGHT.

WEIGHTS AND MEASURES are the standards used in measuring weights, quantities, and volumes. From the beginning of civilization, men have used standards for weighing and measuring. The Bible stories and other ancient writings mention some of these.

Many of the early standards were based on parts of the human body, such as the width of a finger or the span of a hand. Others were taken from what a man could do in a day. A town was "ten days" instead of 900 miles away. Instead of measuring farm land in acres, men used to measure it by the number of days it took to plow the land. A much-used unit of measure in England in the 1500's was the size of a grain of barley. There was little or no connection between one set of these standards and another. This is still largely true of the standards used in the United States. But a uniform system, the metric, has been adopted in many countries and is used for scientific purposes in the United States.

The metric system is based on the decimal system of counting. Each larger unit is ten times the size of the one before it. To change one unit to another—such as meters to decimeters or hectoliters to milliliters—one need only multiply or divide by ten or multiples of ten. Conversion from one English unit to another is discussed in the article DENOMINATE NUMBERS. See METRIC SYSTEM.

The units in the metric system are all subdivisions of multiples of the following units. The square meter is often used instead of the are, and the cubic meter instead of the stère.

meter
gram
liter
are
stère

(a)
(s)

length
weight
capacity
area
volume

To these roots are attached the following prefixes:

micro-	(μ)	1/1,000,000
milli-	(m)	1/1,000
centi-	(c)	1/100
deci-	(d)	1/10
deka-	(dk)	10
hecto-	(h)	100
kilo-	(k)	1,000
myria-	(my)	10,000
mega-	(mg)	1,000,000

The following tables give both the English and the metric systems of measurement. Weights and measures used in the United States are fixed by the National Bureau of Standards.

Linear Measure — U.S.

1 inch (in.)	= 2.5400 centimeters	
12 inches	= 1 foot (ft.)	= 30.48 cm
3 feet	= 1 yard (yd.)	= 0.9144 m
5½ yards	= 1 rod (rd.),	
	or 1 pole (p.)	= 5.0292 m
40 rods, or ½ mile	= 1 furlong (fur.)	= 201.168 m
5,280 feet	= 1 mile (mi.)	= 1.6093 km
3 miles	= 1 league	

Linear Measure — Metric

1 meter (m)	= 39.37 inches
$\frac{1}{10}$ meter	= 1 decimeter (dm) = 3.937 in.
$\frac{1}{100}$ meter	= 1 centimeter (cm) = 0.3937 in.
$\frac{1}{1,000}$ meter	= 1 millimeter (mm) = 0.03937 in.
$\frac{1}{10,000}$ meter	= 1 micron (μ)
micron	= 1 millimicron (m μ)
micron	= 1 angstrom unit (Å)
$\frac{1}{10,000,000}$ milli-meter	= 1 micromillimeter (μ mm)
$\frac{1}{1,000,000}$ micron	= 1 micromicron ($\mu\mu$)
10 meters	= 1 dekameter (dkm) = 393.7 in.
100 meters	= 1 hectometer (hm) = 328.0833 ft.
1,000 meters	= 1 kilometer (km) = 0.62137 mi.
10,000 meters	= 1 myriameter = 6.2137 mi.

Square Measure — U.S.

Square measure has two dimensions—length and width. It is used to express the area of a surface.

1 square inch	= 6.4516 sq. centimeters
144 square inches	= 1 square foot (sq. ft.) = 0.0929 m ²
9 square feet	= 1 square yard (sq. yd.) = 0.8361 m ²
30¼ square yards	= 1 square rod (sq. rd.) = 25.2930 m ²
160 square rods	= 1 acre (A.) = 0.4047 hectares
640 acres	= 1 square mile (sq. mi.) = 258.9998 ha

Square Measure — Metric

The same units are used for square measure as for linear measure. The symbol is a small ² placed to the right of and above the abbreviation, as is done with a figure squared. Three square meters are written 3 m². Sometimes the common units are replaced by the *are*.

1 are (a)	= 1 sq. dekameter = 119.6 sq. yds.
1 centare (ca)	= 1 sq. meter = 1,550 sq. in.
1 hectare (ha)	= 1 sq. hectometer = 2.4710 acres

Cubic Measure — U.S.

Cubic measure has three dimensions—length, width, and depth. It is used to express quantities such as the amount of space in a box, the amount of wood in a block, the volume of air in a rubber ball, and so on.

1 cubic inch (cu. in.)	= 16.3872 cu. centimeters
1,728 cubic inches	= 1 cubic foot (cu. ft.) = 0.0283 m ³
27 cubic feet	= 1 cubic yard (cu. yd.) = 0.7646 m ³

Cubic Measure — Metric

The same units are used for cubic measure as for linear measure. The symbol is a small ³ after the abbreviation. Four cubic centimeters are written 4 cm³. Often the *stere* replaces the more common units.

1 stere (s)	= 1 cubic meter (m ³) = 1.3079 cubic yards
1 decistere (ds)	= 1 cubic decimeter (dm ³) = 3.5314 cu. ft.
1 centistere (cs)	= 1 cubic centimeter (cm ³) = 0.3531 cu. ft.
1 dekastere (dks)	= 1 cubic dekameter (dkm ³) = 13.079 cu. yds.

Capacity — U.S.

LIQUID MEASURE

1 gill (gi.)	= 0.1183 liter
4 gills	= 1 pint (pt.) = 0.4732 l
2 pints	= 1 quart (qt.) = 0.9463 l
4 quarts	= 1 gallon (gal.), 231 cu. in. = 3.7853 l

DRY MEASURE

1 pint (pt.)	= 0.5506 liter
2 pints	= 1 quart (qt.), 67.2 cu. in. = 1.1012 l
8 quarts	= 1 peck (pk.) = 8.8096 l
4 pecks	= 1 bushel (bu.), 2,150.42 cu. in. = 35.2383 l

Capacity — Metric

1 liter (l)	= 0.9081 dry qt. or 1.0567 liquid qt.
$\frac{1}{10}$ liter	= 1 deciliter (dl) = 0.8454 gi.
$\frac{1}{100}$ liter	= 1 centiliter (cl), 0.6102 cu. in. = 0.3381 fl. oz.
$\frac{1}{1,000}$ liter	= 1 milliliter (ml) = 0.2705 fl. dr.
10 liters	= 1 dekaliter (dkl) = 2.6418 gal.
100 liters	= 1 hectoliter (hl) = 26.4178 gal.
1,000 liters	= 1 kiloliter (kl) or 1 stere (s) = 264.178 gal.

Weight — U.S.

Ordinary weight (avoirdupois), troy weight, and apothecaries' weight are all based on the same unit, the *grain*. It was taken originally from the weight of a grain of wheat and is equal to 0.0648 metric grams.

1 grain	= 0.0648 grams
27.34375 grains	= 1 dram (dr.) = 1.7718 g
16 drams	= 1 ounce (oz.) = 28.3495 g
16 ounces	= 1 pound (lb.) = 453.5924 g
100 pounds	= 1 hundred-weight (cwt.) = 45.3592 kg
2,000 pounds	= 1 short ton (sh. tn.) (U.S.) = 0.9072 metric t
2,240 pounds	= 1 long ton (England) = 1.0160 metric t
2,204.62 pounds	= 1 metric ton

Weight — Metric

1 gram (g)	= 15.4323 grains
$\frac{1}{10}$ gram	= 1 decigram (dg) = 1.5432 grains
$\frac{1}{100}$ gram	= 1 centigram (cg) = 0.1543 grain
$\frac{1}{1,000}$ gram	= 1 milligram (mg) = 0.0154 grain
10 grams	= 1 dekagram (dkg) = 0.3527 oz.
100 grams	= 1 hectogram (hg) = 3.5274 oz.
1,000 grams	= 1 kilogram (kg) = 2.2046 lbs.
10,000 grams	= 1 myriagram = 22.046 lbs.
100,000 grams	= 1 quintal (q) = 220.46 lbs.
1,000,000 grams	= 1 metric ton (t) = 2,204.62 lbs.

Besides the weighing and measuring units above,

there are many others which are used for specific purposes.

Surveyors' Measure is based on the Gunter's chain, introduced in England in the early 1600's by Edward Gunter. This chain was used in measuring land and was stretched from one point to another by the surveyors.

Linear Measure

7.92 inches	= 1 link (li.)
100 links, or 66 feet	= 1 chain (ch.)
10 chains	= 1 furlong (fur.)
80 chains	= 1 mile

Area Measure

625 square links (sq. li.)	= 1 square rod (sq. rd.) or 1 square pole (sq. p.)
16 square rods	= 1 square chain (sq. ch.)
10 square chains	= 1 acre (A.)

Engineers' Measure is used by those who plot ground for purposes of building.

1 foot	= 1 link (li.)
100 links	= 1 chain (ch.)
52.8 chains	= 1 mile (mi.)

Land Measure is used when local governments mark off land for such purposes as taxation or recording of ownership.

640 acres or 1 square mile	= 1 section (sec.)
36 sections	= 1 township (T. or Tp.)
North-south row of townships	= 1 range (R.)

Mariners' Measure is used by men on ships.

9 inches	= 1 span
8 spans, or 6 feet	= 1 fathom (fath.)
100-120 fathoms	= 1 cable
6,080.20 feet	= 1 sea mile, 1 nautical mile,
or 1.1515 miles	1 geographic mile
About 3 miles	= 1 league (l.)
60 nautical miles	= 1 degree (deg.)
Speed of 1 nautical mile in 1 hour	= 1 knot (k.)

Shipping of goods also has its own units.

5 cubic feet	= 1 barrel bulk
35 cubic feet	= 1 displacement ton
100 cubic feet	= 1 register ton

Wood Measure is used in buying and selling lumber.

144 cubic inches (1'×1'×1')	= 1 board foot (f.b.m.)
16 cubic feet (4'×4'×1')	= 1 cord foot (cd. ft.)
8 cord feet	= 1 cord (cd.)

Paper Measure is used in the buying and selling of paper.

25 sheets	= 1 quire (qr.)
20 quires, 500 sheets	= 1 standard ream (rm.)
516 sheets	= 1 printers' ream
2 reams	= 1 bundle (bdl.)

Some small papers are still packed in quires of 24 sheets each and reams of 480 sheets each.

Print Measure has special units which describe the size of type.

12 points	= 1 pica
6 picas or 72 points	= 1 inch

Counting Measures are used for anything that can be counted.

12 units	= 1 dozen (doz.)
12 dozen	= 1 gross (gr.)
12 gross	= 1 great gross (g. gr.)
20 units	= 1 score

Troy Weight is used in weighing precious metals and gems.

24 grains	= 1 pennyweight (dwt.)
20 pennyweights	= 1 ounce (oz.t.)
12 ounces	= 1 pound (lb.t.)
$\frac{3}{4}$ grains	= 1 carat (c.)

$\frac{1}{2}$ carat	= 1 carat grain
200 milligrams or 3.0865 grains	= 1 metric carat (c.)

Gold Measure has to do with the purity of the metal.

Pure gold	= 24 karats fine (24K)
$\frac{1}{2}$ pure gold	= 18 karats fine (18K)
$\frac{3}{4}$ pure gold (by weight)	= 1 karat (K)

Silver Measure is also based on purity. The unit that expresses purity is sterling. Sterling silver is .925 (92.5 per cent) pure silver.

Apothecaries' Measures are used in measuring for medicines. Dry medicines are weighed instead of counted or measured.

WEIGHT

20 grains	= 1 scruple (s. ap.) (\mathfrak{z})
3 scruples	= 1 dram (dr. ap.) (\mathfrak{d})
8 drams	= 1 ounce (oz. ap.) (\mathfrak{ss})
12 ounces	= 1 pound (lb. ap.) (\mathfrak{lb})

FLUID MEASURE

1 drop or 0.0616 milliliter	= 1 minim (min.) (\mathfrak{m}) (\mathfrak{m})
60 minims	= 1 fluid dram (fl. dr.) ($\mathfrak{f}\mathfrak{d}$)
8 fluid drams	= 1 fluid ounce (fl. oz.) ($\mathfrak{f}\mathfrak{z}$)
16 fluid ounces	= 1 pint (O)
8 pints	= 1 gallon (C.)

Circular or Angular Measure

60 seconds (")	= 1 minute (')
60 minutes	= 1 degree (°)
30 degrees	= 1 sign (of zodiac)
57.2958 degrees	= 1 radian (found by dividing 180 by π , 3.1416)
90 degrees	= 1 quadrant (quad.) or 1 right angle (L)
1,600 mils (U.S. Army)	= 1 quadrant
360 degrees	= 1 circle or 1 circumference (O)
0.7854 square mil	= 1 circular mil (cir. mil.), the area of a circle with a diameter of 1 mil. ($\frac{1}{1000}$ inch)

Measure of Time

60 seconds (sec.) (")	= 1 minute (min.) (')
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (da.)
7 days	= 1 week (wk.)
14 days	= 1 fortnight
30 days	= 1 calendar month (mo.)
12 calendar months	= 1 calendar year (yr.)
365 days	= 1 common year
366 days	= 1 leap year
10 years	= 1 decade
100 years	= 1 century
1,000 years	= 1 millennium

Money in the United States and Canada is based on the decimal system of tens. The principal unit is the dollar.

U.S. and CANADIAN UNITS

10 mills	= 1 cent (ct.)
10 cents	= 1 dime (d.)
10 dimes	= 1 dollar (\$)
10 dollars	= 1 eagle

ENGLISH UNITS

4 farthings	= 1 penny (d.)
12 pence	= 1 shilling (s.)
20 shillings	= 1 pound (£)
21 shillings	= 1 guinea

The old English penny was like a coin used on the European continent and called a *denarius*. This is why the abbreviation for penny is "d."

Miscellaneous Units

1 cubic yard	= 1 load (for removing dirt)
24 $\frac{1}{2}$ cubic feet	= 1 perch (measure for stone)

100 square feet	= 1 square (of roof and floor materials)
1 rod	= 1 linear perch
1 square rod	= 1 land perch
40 square rods or $\frac{1}{4}$ acre	= 1 rood
4 inches	= 1 hand (for measuring the height of horses)
3 or 4 inches	= 1 palm
$2\frac{1}{2}$ feet	= 1 pace
$\frac{1}{16}$ inch	= 1 line (for describing the size of buttons)
$1\frac{1}{1000}$ inch; 0.0254 millimeter	= 1 mil (for the diameter of wires)
25 pounds (U.S.); 28 pounds (Eng.)	= 1 quarter
14 pounds	= 1 stone (England)
42 gallons	= 1 tierce

Converting from English to metric and from metric to English units is not difficult. English units are changed to metric units by multiplying the number of inches, feet, pounds, etc., by the number of metric units that are contained in one of the unit used. Suppose we are to change 22 miles to kilometers. We simply multiply the number of miles (22) by the number of kilometers that make up one mile (1.6093). The answer shows that 22 miles equal 35.4046 kilometers.

Metric units are changed to English units in the same way — by multiplying the number of meters, grams, and so on, by the number of English units in one of the types of unit used. To change 14 ares to square feet, we first multiply the number of ares (14) by the number of square yards in one are (119.6). The answer is 1,674.4. There are 9 square feet in one square yard. Therefore, we must multiply 1,674.4 by 9. Our answer shows us that there are 15,069.6 square feet in 14 ares. P.F.

Related Subjects. The reader is also referred to:

Apothecaries' Weight (with list)	Avoirdupois Calendar (with list)
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Diamonds Weighing as Much as the Aga Khan, a leader of the Moslem faith, were given to him on the sixtieth anniversary of his rule. The 243½-pound Aga Khan sat on one side of the scale, and the diamonds equalling his weight were placed on the other. The ceremony took place in Bombay, India.



Killian, U.S.D.A.

Butter Is Weighed before Being Wrapped

Cubic Measure	National Bureau of Standards
Denominate Number	Sounding
Distance (with list)	Surveying (with list)
Electric Measurement (with list)	Time
Kilocycle	Tonnage
Measurement	Troy Weight
Metric System (with list)	Unit
Money (with list)	Volume (with list)
	Weight

DEVICES AND INSTRUMENTS

Anemometer	Plumbline
Balance	Rain Gauge
Barometer	Sextant
Caliper	Speedometer
Dipping Needle	Steelyard
Fathometer	Tachometer
Galvanometer	Thermometer
Gas Meter	Voltmeter
Hygrometer	Water Meter
Lead, Sounding	Weighing Scale
Pedometer	

WEINGARTNER, VINE GAHRT ner, FELIX VON (1863-1942), was a conductor, composer, and writer of music. He was born at Zara, Dalmatia, but became a Swiss citizen in 1931. He studied at the Conservatory at Weimar, in Germany, and also with Franz Liszt. From 1884 until his death, Weingartner served as conductor of many of Europe's leading orchestras, and appeared as guest conductor in cities throughout the world. G.B.

WEISGARD, LEONARD (1916-), won the Caldecott Medal in 1947 for his illustrations in the book *The Little Island* by Golden MacDonald. Weisgard was born in New Haven, Conn., and studied art at Pratt Institute. His illustrations are noted for lavish use of color.

WEISMANN, VISE mahn, AUGUST (1834-1914). See BIOLOGY (History).

WEIZMANN, VYTS mahn, CHAIM (1874-), is a Jewish chemist and Zionist leader. During World War I he performed invaluable service to the Allies by discov-

WELDER

ering synthetic acetone which was used in making ammunition. He succeeded in interesting British statesmen in the Zionist idea and was thus helpful in having the British government in 1917 issue the Balfour Declaration, which promised to make Palestine the Jewish national homeland. Weizmann was born at Motol in Grodno, Russia, and was educated at Pińsk and the universities of Berlin and Freiburg. In 1904 he began to teach at the University of Manchester, England. He was elected President of the World Zionist Organization in 1920. In 1948 he became Provisional President of the new state of Israel in Palestine.

I.J.R.

See also ZIONISM.

WELDER. See WELDING (Vocational Opportunities).

WELDING. Welding is the process of joining two or more pieces of metal into one continuous body. The two metallic surfaces must be brought into such intimate contact that the metal atoms at one surface intermingle with those at the other surface. Such intimate contact requires first of all perfectly clean surfaces, with no scale or foreign matter to interfere. During the welding, a chemical compound called a *flux* is used. The flux melts and dissolves any scale or oxide that may form when the metal is heated. Borax and salt are examples of welding fluxes, but patented mixtures are usually employed. The weld is then made either by application of pressure (usually to metal made plastic by heating), or by surface fusion.

Pressure Welding began hundreds of years ago, when blacksmiths heated the edges of metal until they became soft, then hammered them together. This joined the metal, but did not result in complete fusion. Today pressure welding still depends on the basic principle of heat, *plus* pressure, to make the weld. But instead of heating the metal edges with fire, they are now usually

WELDING

heated by the resistance which they offer to the passage of an electric current through them. This is *electric resistance welding*. Instead of the crude hammering of the blacksmith, the sheets are pressed together in great hydraulic presses.

Fusion Welding requires far greater temperatures than does pressure welding. Usually molten metal is added at the joint by a *filler rod* which the welder holds. At the same time, the metal edges which form the joint must be heated well above their melting point. There are three main methods of surface fusion: electric arc, oxy-acetylene, and thermit welding.

Electric arc welding is considered the best of all surface fusion methods for general purposes, because it creates the highest temperatures. The temperature in electric arc welding may be more than 7,500° F. The arc is formed by an electric current which travels down through the welder's tool, then jumps across the intervening space to the metal joint, or it may travel between the joint and the metal filling rod. When the arc is formed between the joint and a graphite or carbon rod, it is called *carbon-arc* welding. When the arc is formed between the metal filler rod and the joint, it is termed *metallic-arc* welding. Metallic-arc welding is the commoner method. The flux is applied in the form of a coating on the filler rod. *Shielded arc* welding is a method using a flux which turns to gas under heat. The gas forms a protective envelope around the joint during the welding. See ELECTRIC WELDING.

Oxyacetylene welding. The use of a blowpipe in metalworking and other arts is an ancient process. The Egyptians, Greeks, and Romans used a crude blowpipe to work lead and other metals of low melting points. The blowpipe has also been used for many years in working precious metals. But it was not until men discovered how to use gases that burn at very high temperatures that blowpipes were developed for welding metals.

Scientists knew as early as 1895 that a mixture of certain proportions of oxygen with acetylene would burn at a very high temperature. But a suitable blowtorch for using such a hot flame was not developed until 1903. Since then the oxyacetylene method of welding has come into wide use. The welding torch is supplied from a tank with acetylene gas. It is also connected with a tank of oxygen by a nozzle which allows just the right amount of oxygen to mix with the acetylene to obtain the heat desired. The welder holds the welding torch in one hand, and applies the hot flame (usually reaching a temperature of about 6,000° F.) to the metal joint. In the other hand, he holds a slender rod of metal which he also places in the flame of the torch. As the metal filler rod melts, he stirs the molten metal thoroughly in between the edges of the melting metals which are to be welded. Thus, he forms a strong, even weld.

The oxyacetylene method is also used to cut metals. The flame is used first to heat the metal very hot over a small spot, and then a jet of oxygen is directed onto the hot metal. This generates even more heat, which fuses the metal and causes it to flow away, leaving a sharp, clean cut. See ACETYLENE.

Thermit welding was one of the first fusion welding methods to be perfected. Since its discovery in Germany in 1897, it has come into wide use, especially in railway



Crane, Black Star

The Oxyacetylene Welding Torch is a dual-purpose tool. It is used to join metal parts as well as to cut them apart.

and ship repair shops. This process is based on the chemical reaction which occurs between aluminum and iron oxide under heat. A mixture of the two is heated at one spot, setting up a chemical reaction which generates great heat throughout the entire mixture. The aluminum takes the oxygen from the iron, and leaves the molten iron free, at a temperature of about 5,000° F. The molten iron is poured into a mold which encloses the parts to be welded. The edges of the joint are already heated to a plastic state, and they combine readily with the molten iron to form a good, solid weld. See THERMITE.

Vocational Opportunities

The demand for good welders in many types of industry has increased constantly with new developments in welding processes and in mass production methods. Skilled welders draw high hourly wages, and the technical nature of their work often opens up opportunities for advancement in the industry. Welding is taught in all metal trade schools and in many high schools. A.B.U.

WELDING, ELECTRIC. See ELECTRIC WELDING.

WELF. See GUELPHS AND GIBELLINES.

WELFARE ISLAND is a narrow strip of land in the East River, between Manhattan and Long Island, New York. The island is about a mile and a half long and an eighth of a mile wide. The Queensborough Bridge crosses the island where it spans the East River at Fifty-ninth Street in New York City. Many institutions of public service are located on Welfare Island. These include the Metropolitan Hospital, the New York City Home for Dependents, the Central Neurological Hospital, the Cancer Institute, the Welfare Hospital for Chronic Diseases, and the New York City Hospital. For many years the island was known as Blackwells Island. The City of New York bought the island from Mrs. Robert Blackwell for \$50,000 in 1828. The New York City Penitentiary was once located here, but was removed in 1935. E.H.L.

WELFARE ORGANIZATIONS. See FAMILY WELFARE ASSOCIATION OF AMERICA; JEWISH WELFARE BOARD, NATIONAL; NATIONAL CATHOLIC WELFARE CONFERENCE; PUBLIC WELFARE ASSOCIATION, AMERICAN. See also the section on SOCIAL ORGANIZATIONS in the READING AND STUDY GUIDE.

WELFARE WORK. See SOCIAL SERVICE.

WELL. A water well is a hole in the ground from which water is drawn. When rain falls or snow melts, some of the water soaks into the ground. There it goes deeper and deeper until it is held back by tight layers of hard earth or rock. This underground water is called *ground water*. The top level of the water-soaked layer of earth is called the *water table*. A well must be deep enough to reach below the water table.

In damp places, the water table may be just below the surface. It is easy to reach it by digging. A dug well is usually lined with bricks, porous concrete, or stone to keep the sides from caving in. In drier places, the water table may be hundreds of feet down. It may then be necessary to drill the well, and sink pipes. Deep wells have power-driven pumps to draw out the water. Shallow wells often need only buckets, drawn by hand.

Well digging goes back to the early Chinese and Egyptians. Many people still depend on wells for their

water supply, especially in rural places. Some cities also get their water supply from wells. Underground water is usually pure, for the ground makes a good filter. Sometimes it contains minerals that dissolve in the ground water and form a *mineral well*. A well must be located so it does not collect poisons or disease germs. Well water is not safe for drinking if the water table is less than ten feet below the surface. The well should be at least twenty feet deep. A well should not be less than 100 feet away from a privy or cesspool. It should never be located so sewage drains toward the well.

Water may be dangerous if the well is in limestone soil, for limestone is not a good filter. Sand, sandstone, clay, and gravel are good filters. It is also important to see that surface water does not drain into the well and get into the filtered ground water. Well water for drinking should be tested at regular times. This test will tell whether the water contains harmful chemicals or bacteria. In general, water from a deep, drilled well is purer than water from a dug well.

In some places a layer of hard rock under the soil has a second layer of ground water below it. This deep water is usually under pressure, and may rise in the well or even spout to the surface without a pump. A well that overflows or spouts is called an artesian well. E.D.W.

See also ARTESIAN WELL; GROUND WATER; SPRING; WELL DRILLING.

WELLAND SHIP CANAL. This canal is one of Canada's greatest engineering projects. It forms a navigable waterway between Lake Erie and Lake Ontario. The only natural connection between these two lakes is the Niagara River, whose great falls and rapids make it useless as a commercial waterway.

The Welland Canal is 27 miles long, 200 feet wide at the bottom, and 310 feet wide at the surface line. It extends from Port Colborne to Port Weller, which is a few miles west of Port Dalhousie. A ship more than 650 feet long, carrying 530,000 bushels of grain, can sail on the canal. Lake Erie is 325 feet higher than Lake Ontario. Ships are raised and lowered by seven stone locks and one guard lock.

The project to connect Lake Erie and Lake Ontario was first attempted in 1824. The original canal was built by a private company, and cost about \$7,700,000. A small ditch was dug from Port Dalhousie on Lake Ontario to Port Robinson on Chippawa Creek. Ships sailed down the creek to the Niagara River, and then



The Old and New Welland Canal, connecting Lake Erie with Lake Ontario. (1) New canal; (2) old canal; (3) branch.

went up Lake Erie. In a short time, the shipping industry was looking for a larger waterway to handle ships of much greater length than could be sailed on the first canal. The project was taken over by the Government of Upper Canada, which is now Ontario. It was greatly enlarged in 1871, at a cost of \$21,749,000, or about three times the cost of the original canal.

The Welland Canal of today is the result of added improvements which were begun by the Canadian government in 1912. The official opening of the canal took place on August 6, 1932. The project cost \$130,000,000. Only the Suez and Panama canals cost more to build. The Welland Canal is used as a commercial waterway between Canada and the United States. Huge vessels carrying thousands of tons of grain, iron ore, and coal sail through the waters of the canal. Ships can sail the new canal in eight hours or less, compared to the sixteen hours required over the old waterway. The Welland Canal is an important part of the projected Saint Lawrence Waterway.

See also SAINT LAWRENCE WATERWAY AND POWER PROJECT.

WELL DRILLING. Untold riches in the form of gases and liquids lie below the surface of the earth. In order to get at the oil, gas, or water which is found deep in the earth, a hole must be dug. Most deep wells are drilled. The common well-drilling tool uses a heavy flat blade which has a steel cutting edge, shaped like a chisel, at one end. This drill is hammered into the earth with great force, crushing the rock beneath it. For drilling through harder rock, a diamond drill may be used. A third type of drilling is called the hydraulic rotary system of drilling. A round drill with several blades is turned rapidly by water pressure so that it eats its way through rock.

In the first method of drilling, well drillers first build an upright frame, or a derrick, over the spot where the hole is to be bored. The derrick is usually about twenty feet across at the base and seventy feet high. Hanging from the derrick are two pulleys. One supports the crushing bar. The other supports a bucket for removing the powdered rock and earth. The crushing bar, or drill, is attached to a cable which is passed over a pulley. Steam power raises and lowers the bar. With each blow into the earth, the flat drill is turned slightly, to make an almost circular hole. Soon there is so much debris in the hole that the drill can no longer work. Then the steel bucket is lowered, filled with mud, and hoisted to the surface. This bucket is fitted with a bottom which opens inward and works like a valve. The bottom is forced open as the bucket descends, and closes as the bucket is lifted. Water is poured into the hole from time to time. This changes the rock dust to mud, and makes it easier to take out.

Drillers line the upper parts of deep wells with a wrought-iron or steel casing. This prevents the caving-in of soft rock and keeps out surface water. With such an outfit, holes 3,000 to 4,000 feet deep can be driven. But the expense increases as the work reaches the lower levels.

In drilling for oil, the "percussion method" is most often used. The percussion method uses a string of long, narrow tools which may be sixty feet long and weigh as much as 2,000 pounds. The weight of this string will send it deeper in a few weeks than the older method does in as many months. Depths of over 12,000 feet have

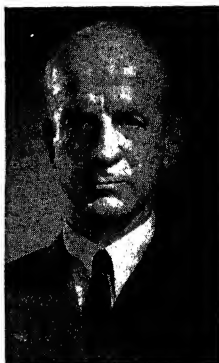
been reached. Oil wells have also been drilled at an angle to reach oil deposits beneath the sea. D.W.T.

See also WELL.

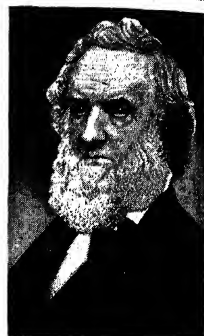
WELLES, welz, GIDEON (1802-1878), was Secretary of the Navy in the cabinet of President Abraham Lincoln. He was born at Glastonbury, Conn., and studied at Norwich University. From 1826 to 1836 Welles edited the Hartford (Conn.) *Times*. From 1836 to 1849 he was chief of the Bureau of Supplies in the United States Navy Department.

Welles was originally a Democrat, but he joined the Republican party when it was organized. At the beginning of the War between the States he was appointed Secretary of the Navy. In this position, he showed great executive ability. Under his management a blockade was set up along the Confederate coast, and a fleet of transports and ironclads was formed on the Mississippi River. After the war, Welles served under President Andrew Johnson and vigorously upheld the President's reconstruction policy. W.B.H.

WELLES, SUMNER (1892-), is an American diplomat. He was Under Secretary of State from 1937 to 1943.



Keresh
Sumner Welles, American diplomat and writer



Brown Bros.
Gideon Welles was one of Lincoln's close advisers.

Welles was born in New York City and was educated at Groton School and Harvard University. At the age of twenty-two he began his diplomatic career as Secretary to the United States Embassy in Japan. From 1917 to 1919 he served in Argentina. In 1920 he entered the State Department as the assistant chief, and later chief, of the Latin American Affairs Division. In 1924 he acted as mediator in the Honduras revolution. In 1933 he was appointed assistant Secretary of State. After his resignation Welles became a

radio commentator and newspaper columnist. E.E.Ro.

WELLESLEY COLLEGE is a privately controlled liberal arts school for women at Wellesley, Mass. It grants the degrees of B.A., M.A., and M.A. in education, and M.S. in hygiene and physical education. All resident students live in dormitories. The school was founded in 1870 by Henry Fowle Durant, and opened in 1875. It has an average enrollment of about 1,500. M.C.L.

WELLINGTON (population 172,887), is the capital and one of the chief seaports of New Zealand. Wellington's central location was one reason for its selection as the Dominion capital. It lies on the deep harbor of Port Nicholson, on the southern coast of North Island. The

harbor at Wellington is large and beautiful, and the largest ocean-going vessels can dock in it.

Wellington is a modern city, with fine public buildings, two cathedrals, a library, beautiful public parks, and a seaside resort. More than 1,600 of the city's 16,000 acres are given over to parks and forest preserves. The public botanical gardens are excellent, and thousands of flower gardens are cultivated by homeowners. Victoria University College is in Wellington.

Wellington was founded by the New Zealand Company in 1840. It became the capital of New Zealand twenty years later. E.E.Er.

WELLINGTON, ARTHUR WELLESLEY, DUKE OF (1769-1852), was a British soldier and statesman who was known as "the Iron Duke." He is famous as the general who overcame the armies of Napoleon in Spain and Portugal and defeated Napoleon at the Battle of Waterloo.

Young Soldier. Wellington was born in Dublin, Ireland, the fourth son of Garrett Wellesley, Earl of Mornington. The young man was educated at Eton College and at a military college in France. At eighteen he entered the army as an ensign. Wellington rose rapidly and by 1796 had reached the rank of colonel. He first saw combat in 1794 in the campaign in Flanders and made a reputation for himself as a brave soldier. In 1796 his regiment was sent to India, where his brother was governor-general. Wellington became a major general before he was thirty-five, and in 1803 he was given command of the British forces in the Mahratta War. He soon defeated the Mahratta chiefs and firmly established British power in India.

Peninsular War. In 1805 Wellington returned to England, and shortly afterward was elected to Parliament. Two years later he was appointed Chief Secretary for Ireland. In 1808 Spain revolted against Napoleon, and the English sent troops there to help them. Wellington was promoted to lieutenant general and was given command of one of the English divisions fighting in the peninsula of Spain and Portugal. Three weeks after he landed in Portugal, he defeated the French in the Battle of Vimeiro and forced them to leave Portugal.

Victory in Spain. In 1809 Wellington became commander of all the British forces in the Peninsular War. He received little help from the inefficient armies and governments of Spain and Portugal. But his small army was able to win victory after victory. Slowly he drove the French forces from the peninsula. Early in 1814 Wellington was victorious at the Battle of Toulouse, and the

British troops were able to enter France. In April of that year Napoleon quit his throne, and the war ended. Wellington returned to England in triumph and was given the title of Duke of Wellington.

Victory at Waterloo. In July, 1814 Wellington was appointed Ambassador to France. The following year he represented Great Britain at the Congress of Vienna. When Napoleon escaped from Elba and returned to France, Wellington took command of the Allied forces in The Netherlands. At the Battle of Waterloo, Wellington fought Napoleon himself for the first time. In this battle Wellington rode at the head of his troops and completely crushed Napoleon's power. After that, Wellington commanded the army



Ewing Galloway

Duke of Wellington, great British soldier

which for a short time occupied France.

Political Career. In 1818 Wellington returned to England and served in various government and diplomatic positions. In 1827 he became commander in chief of the army, but resigned the next year to become Prime Minister. Wellington belonged to the Tory party, but several times as Prime Minister he angered his supporters by favoring bills suggested by the Whigs. The people demanded Parliamentary reform, and Wellington's opposition to reform made his government very unpopular. In 1830 he was forced to resign.

In 1834 the Tory party returned to power, but Wellington refused to become Premier again. Seven years later he became a member of Sir Robert Peel's cabinet and again became commander in chief of the army. In 1846 he retired. During the last years of his political career, he supported reform and regained his popularity. He was buried in Saint Paul's Cathedral. P.K.N.

See also BLÜCHER, GEBHARD LEBERECHE VON, PRINCE OF WAHLSTATT; GREAT BRITAIN (History [War with France]); NAPOLEON I; VIENNA, CONGRESS OF; WATERLOO, BATTLE OF.

WELLMAN, WALTER (1858-1934). See DIRIGIBLE (Dirigibles in the United States).

WELLS, HENRY (1805-1878). See WELLS, FARGO & COMPANY.

WELLS, "H.G." HERBERT GEORGE (1866-1946), was one of the best-known of modern British writers. He was a novelist, historian, scientific writer, sociologist, and one of the foremost literary figures of his time.

He achieved his first fame with a series of fantastic scientific novels that were intended to express his social theories, but which people enjoyed as romances instead. Later Wells began to write humorous, satirical novels of English life, such as his *Kipps* and *Love and Mr. Lewis-ham*. Wells thought of himself as something of a political prophet. In his last years he made many gloomy predictions in such works as *The Shape of Things to Come*.

After World War I Wells began to write realistic novels to express his social and political beliefs. But



Wellesley College

Tower Court Dormitory at Wellesley College

these novels soon began to be so full of his theories that some critics refused to call them novels. In 1920 Wells turned away from the novel and wrote *The Outline of History*, a masterful attempt to rewrite history in terms of the world as a whole instead of individual nations.

Wells was born into a middle-class family at Bromley, Kent. The boy was a brilliant student and won scholarships to the Royal College of Science and to London University. After he was graduated in 1888, Wells worked as a private tutor in biology for several years. In 1893 he returned to London and became a journalist. Two years later he wrote *The Time Machine*, his first scientific novel. L.J.

His Works include *The Invisible Man*; *The Island of Dr. Moreau*; *Tono-Bungay*; *Mr. Brilling Sees It Through*; *The History of Mr. Polly*; and *Experiment in Autobiography*.

WELLS, HORACE (1815-1848). See DENTISTRY (History).

WELLS COLLEGE is a privately controlled school for women at Aurora, N.Y. Courses offered lead to bachelor's and master's degrees. It was chartered as the Wells Seminary for the Higher Education of Young Women in 1868, and received its present name in 1870. The school has an average enrollment of about 270.

WELLS, FARGO & COMPANY was an early American express organization. It was founded in 1852 by Henry Wells and William G. Fargo, and had its headquarters in San Francisco. Wells, Fargo & Company operated west of the Mississippi River, while the American Express Company carried on its business throughout the eastern parts of the United States.

Wells, Fargo & Company soon became very powerful. Many persons in districts which had no postal service depended upon the organization to carry their letters, as well as their packages and freight. The services of the organization became nationwide, and then world-wide. In 1918 Wells, Fargo & Company united with the American Express Organization. J.D.Hr.

See also FARGO, WILLIAM G.

WELSBACH, VELS bakh, CARL AUER, BARON VON (1858-1929), was an Austrian chemist and pioneer in artificial lighting. He is chiefly noted as the inventor of the Welsbach mantle, a gas light which was used throughout the world. Welsbach also invented the osmium filament for electric lamps and was the first to isolate the elements neodymium and praseodymium. He was born in Vienna, and studied chemistry at the University of Heidelberg. Later he attended the University of Vienna, where he made his first gas lights. E.Y.

See also NEODYMIUM; RARE EARTH.

WELSH. See WALES (The People).

WELSH CORGI. See DOG (color plate, Working Dogs).

WELSH LANGUAGE AND LITERATURE. See WALES (Language and Literature).



Karah
H. G. Wells, British historian and fiction writer

WELSH TERRIER. See DOG (color plate, Terriers).
WELTERWEIGHT. See BOXING (Marquis of Queensberry Rules).

WELWITSCHIA, *wel WICH ih ah*, is a peculiar plant which grows in the sandy deserts of the southwestern coasts of Africa. It was named for Friedrich Welwitsch, an Austrian botanist of the 1800's. The plant has a short, woody trunk which rises from a large taproot and spreads like a table top to a width of five or six feet. It looks somewhat like a giant, flattened mushroom. It is also called Tumboa.

A single pair of green leaves springs from the top. They are two or three feet wide and often twice as long. The leaves are woody, and grow from the base. They live as long as the plant does. Hot winds blow the leaves about and split them into long, slender, ribbonlike shreds which trail on the dry ground.

Every year stiff, jointed, stemlike growths from six to twelve inches long develop at the point where the leaves join the trunk. These growths bear small, erect flower spikes, or cone clusters, both male and female. The male cones are small, but the bright scarlet female cones are about as large as a fir cone. They are pollinated by insects. The plants live 100 years or more, with only the



Chicago Natural History Museum

The Welwitschia Plant of Southwestern Africa has two long leaves, each of which is usually split by the wind. This museum worker is assembling a model for exhibition.

two large leaves to manufacture food during this entire time. E.C.J.

Classification. *Welwitschia* is a genus in the *Gnetaceae* family. The only species is *W. mirabilis*.

WEN. A wen is a growth, or cyst, in the skin. It forms when the secretion of a sebaceous gland collects inside the gland. One or more round or oval lumps, from the size of a pea to that of a large walnut, may slowly appear on the scalp, face, or shoulder. Wens are soft and painless. They hold a yellowish-white matter, which may sometimes be squeezed out. At times wens become so annoying that they must be removed by surgery. See also CYST. H.S.Ru.

WENCHOW, *wun joh* (population 631,276), is a seaport of Chekiang Province, China. It is situated on the

Wu River, about 40 miles from the East China Sea and 240 miles southwest of Shanghai. The city is surrounded by high walls. It is an important trading center for farm products and raw materials from the interior. Wenchow was heavily damaged in fighting between the Chinese and Japanese before and during World War II. It was taken and retaken several times by both Chinese and Japanese forces.

G.B.Cr.

WEND. See DRESS (Germany).

WENTWORTH, THOMAS, EARL OF STRAFFORD. See STRAFFORD, THOMAS WENTWORTH, EARL OF.

WEREWOLF. *WEER* *woolf*, is a word of Anglo-Saxon origin which means *man-wolf*. There are many legends concerning the werewolf. According to Greek mythology, Lycaon served human flesh to Zeus and was turned into a wolf as a punishment. Such ancient writers as Ovid, Herodotus, and Pliny told stories about werewolves. An Irish legend says that Saint Patrick turned King Vereticus into a wolf. It was believed in the Middle Ages that certain persons who were men during the day changed into wolves at night. Such werewolves ate human flesh, and could be killed only with a silver bullet. The idea still exists in middle European countries. Shortly after Germany was defeated in World War II, an attempt was made to start a "werewolf movement" of resistance against the Allies. But the movement had little success.

The scientific name for werewolf is *lycanthrope*, from the name of Lycaon. *Lycanthropy* is a certain form of mental illness in which a person imagines himself to be a wolf.

P.Col.

WERFEL, VER fel, FRANZ (1890-1945), was a Bohemian novelist, playwright, and poet. Perhaps his best-known works are the epic novel *The Forty Days of Musa Dagh* and the deeply mystic *The Song of Bernadette*. Many critics consider *The Pure in Heart*, a story of Austria before World War II, his best work.

Werfel was born in Praha and studied at the University of Praha. His earliest works were poems which criticized the militaristic philosophy of the years just before World War I. He served in the Austrian army during the war and began writing plays. His first novelette, *Not the Murderer*, which was published in 1919, was one of the first important works in the Expressionist movement. Werfel escaped from Austria in 1940 and came to the United States.

Werfel's work is particularly distinguished by the fact that he was one of the few, if not the only, modern writer to publish superior works in three main fields of literature — the novel, drama, and poetry.

L.G.Wt.

His Works include the plays *Goat Song*, *Juarez* and *Maximilian*, and *Jacobowsky and the Colonel*; the novels *Verdi* and *Class Reunion*; and many lyric poems.

WERGELAND, VER geh lahn, HENRIK ARNOLD (1808-1845), was a Danish lyric poet, playwright, and editor. He fought for modern ideas in literature, and often wrote satires against the classicists under the pen name of Siful Sifadda.

WESCOTT, GLENWAY (1901-), is an American novelist. His novel *The Grandmothers* was awarded the Harper prize in 1927. His *Apartment in Athens* was a 1945 best seller. Wescott was born near Kewaskum, Wis., and studied for a time at the University of Chi-

cago. For many years he lived in France, and he did not return to the United States until 1939.

L.J.

His Works include the novelette *The Pilgrim Hawk*; *The Apple of the Eye*; and the books of short stories *Good-Bye Wisconsin* and *Fear and Trembling*.

WESER, VA zer, RIVER.

This important German waterway rises near the Thuringian Forest, southwest of the Harz Mountains. The Weser follows a winding, northerly course through picturesque country. It empties into the North Sea through a wide mouth 280 miles from its source. In 1894 the channel of the river was deepened from its mouth to Bremen, forty-six miles from the North Sea. River boats can navigate the entire length of the stream. Above Bremen locks and dams aid navigation. Hameln, the "Hamelin Town" of Browning's "Pied Piper," is on the banks of the Weser.

W.R.McC.

WESLEY, JOHN, and CHARLES, were two British clergymen, brothers, who founded Methodism. John Wesley, the older brother, was the actual head of the Methodist movement, and Charles Wesley played a large part in its development.

John Wesley (1703-1791) was born at Epworth, Lincolnshire, England. He was the fifteenth child of Samuel Wesley, rector of Epworth. The young man studied at Charterhouse School in London, and later at Christ Church, Oxford University. He was graduated in 1724 and the next year became a clergyman. At first he led an active social life and took little interest in his religious duties, but later his mind turned to more serious matters. Wesley began to read the writings of Jeremy Taylor and Thomas a Kempis and to act according to their teachings. In 1727 he became curate to his father.

The Holy Club. At this time Wesley's brother Charles was attending Oxford, and unlike his older brother was a very pious student. Charles had gathered a group of very serious and religious young men about him and



Platt Lynes

Glenway Wescott, popular American writer



Joseph Boggs Beale, Modern Enterprises

John Wesley, Founder of Methodism, rode through England to preach his doctrines and gain converts.

these men lived a very strict and orderly life. The other students mocked them and called the group "the Holy Club" and the members, "Methodists." In 1729 John Wesley returned to Oxford as a Fellow of Lincoln College. The gay youth had changed, and soon after his arrival he became the leader of this group.

Missionary to Georgia. In 1735 General Oglethorpe, governor of the Georgia colony in America, invited the two brothers to come there as missionaries to the Indians and the settlers. John Wesley's work among the Indians was not very successful, and he was unpopular with the colonists because of his strictness.

Influence of Moravians. He accomplished little, and in 1738 he returned to England. On the journey to Georgia he met a group of Moravians, and their calm faith during the dangers of the voyage made a lasting impression on him. On his return to London he visited one of the Moravians, Peter Bohler, and learned from him of "saving faith" in Christ. On May 24, 1738, he attended a little meeting in Aldersgate Street and became convinced of Christ's saving power. This meeting was the turning point of his career. Soon afterward, with his brother Charles and their friend George Whitefield, he began his career as an evangelistic preacher.

Beginnings of Methodism. Most of the clergy of the Church of England did not agree with Wesley and his associates, and many refused to allow them to use their churches. Wesley often preached in the open air and organized his followers into groups which he called "classes." The first group met in a shop near Temple Bar, and later in Fetter Lane, near Newgate Prison. Wesley appointed "class leaders" to take charge of the groups, and later many of these men became lay preachers. He traveled continuously, riding on horseback from group to group as the movement spread. Often he preached three or four times a day to immense crowds. Wesley was a tireless worker, and not only took care of the finances of the organization, but wrote hundreds of religious pamphlets about the new movement. But during all this time Wesley and the Methodists continued to remain in the Church of England. Wesley had no intention of founding a new church, and it was only after his death that the movement in England broke away from the established church.

The Movement Spreads. In 1743 the movement began to spread as far north as Newcastle, and as far south as Cornwall. In 1747 Wesley visited Ireland, and was received so enthusiastically that he made twenty more trips there. Four years later he made the first of many visits to Scotland. In 1750 Wesley married Mary Vazeille, a widow with four children. His wife made no attempt to share his life and the marriage was very unhappy. After many years they finally separated.

In 1744 Wesley held his first conference with the leaders of the societies. From that time on Wesley held a conference every year. In 1784 the American Methodists were formed into a separate church which by 1850 had become the largest Protestant church in America. At the time of his death, Wesley had more than 120,000 followers in England.

Charles Wesley (1707-1788) is best known for his hymns. He was the song writer of the Methodist movement and wrote more than 6,000 hymns, including "Jesus, Lover of My Soul." He was born at Epworth and studied at Westminster School and Christ Church, Oxford. In 1735, after becoming a minister, he sailed with

his brother John to Georgia to become secretary to General Oglethorpe. After his return to England he joined his brother in the new movement and preached in various parts of the country. Charles was more conservative in his views than his brother, and, like him, strongly opposed separation from the Church of England. W.W.S. See also ASSURY, FRANCIS; HYMN; METHODIST.

WESLEYAN COLLEGE is a liberal arts school for women at Macon, Ga. It is controlled by the Methodist Episcopal Church. The Wesleyan Conservatory of Music and School of Fine Arts is an affiliated institution. The school was founded in 1836 as the Georgia Female College, and received its present name in 1919. Average enrollment is about 400. N.C.M.C., Jr.

WESLEYAN METHODIST. After the Revolutionary War in America, the Methodist Church in the United States adopted the episcopal, or bishopric, form of church organization. The main body of Methodists in England continued to use the form of organization begun by John Wesley, the founder of Methodism. They called themselves Wesleyan Methodists to distinguish themselves from the Methodist Episcopal Church in America. In 1932 the Wesleyan Methodists merged with other Methodist groups. A group of Methodists in the United States withdrew from the Methodist Episcopal Church in 1843 because of a disagreement on the slavery question. They formed a new body called the Wesleyan Methodist Connection. This church now has about 29,000 members. See also METHODIST; WESLEY, JOHN, AND CHARLES.

WESLEYAN UNIVERSITY is a privately controlled liberal arts school for men at Middletown, Conn. Students at Wesleyan reside in dormitories and fraternity houses. The school was founded in 1831 by the Methodist Episcopal Church, but was never formally connected with it. The average enrollment is about 650. A.L.G., Jr.

WESSEX. See ANGLO-SAXON; ENGLAND (Anglo-Saxon Period).

WEST, BENJAMIN (1738-1820), was an early American painter. He is best known for his historical pictures, which were considered new and original in his time. In painting historic scenes, the English artists had always painted the figures dressed in classical robes. But West broke away from this custom in his "Death of General Wolfe" and showed the characters wearing their regular clothes. West was greatly admired in his day. But today his reputation has declined and his work is considered second-rate and lacking in imagination. He is chiefly remembered today as a teacher and adviser of younger American artists.

West was born in Springfield, Pa. He taught himself to paint with homemade materials. In 1755 he set himself up as a portrait painter in Philadelphia, but four years later moved to New York City. In 1760 he went to Rome, and three years later he visited England. Here he was welcomed so enthusiastically that he decided to



Brown Bros.

Charles Wesley is best known as a hymn writer.



Brown Bros.

Benjamin West, early American painter

make London his home. In 1772 King George III appointed him his historical painter.

West encouraged many young American artists, invited them to his home, and often helped them financially. Among his pupils were Charles Peale, Gilbert Stuart, and John Trumbull. He helped found the Royal Academy, and in 1792 became its president. M.Br.

See also **PAINTING** (Great American Paintings, color plate, Penn's Treaty with the Indians).

His Works include "The Battle of La Hogue" and "Christ Healing the Sick."

WEST, REBECCA (1892-), is one of the best-known of modern English writers. Both her subject

matter and her manner of writing have kept her books from becoming widely popular, but critics generally have admired her sensitive perception and her passionate and brilliant style. Her works range from novels to essays on literature and politics. Her writings also include a number of personalized pieces of reporting.

Rebecca West was born in County Kerry, Ireland, and was educated privately. Her name originally was Cicily Isabel Fairfield. For a time she worked on newspapers and magazines. L.C.W.

Her Works include the novels *The Judge* and *Harriet Hume*; and the nonfiction books *Henry James*, *D. H. Lawrence: An Elegy*, and *Black Lamb and Grey Falcon*.

WEST, THE. See **GOLD RUSH**; **INDIAN, AMERICAN**; **LEWIS AND CLARK EXPEDITION**; **NATIONAL MONUMENT**; **NATIONAL PARK**; **PIONEER LIFE**; **PONY EXPRESS**; **RANCHING**; **ROCKY MOUNTAINS**; **TRAILS OF EARLY DAYS**; also names of western states, as **CALIFORNIA**; **COLORADO**.

WEST BADEN. See **INDIANA** (Natural Resources).

WESTCOTT, EDWARD NOYES (1846-1898), was an American writer, remembered chiefly for his one novel, *David Harum*, which was published shortly after his death. Westcott was born in Syracuse, N.Y., and became a successful banker there. He wrote *David Harum* while he was dying of tuberculosis. C.Me.

WESTERLY WIND. See **PREVAILING WESTERLY**.

WESTERN AUSTRALIA is the largest state in the Commonwealth of Australia. This vast region covers the western third of the continent. Western Australia has great natural resources, but it is often called "The Cinderella State" because it has developed more slowly than the other Australian states.

The Land and Its Resources

Location, Size, and Surface Features. Western Australia covers an area of 975,920 square miles. The western coast line runs for about 5,200 miles along the Indian Ocean. It is regular, with few bays or harbors. The Darling mountain range runs north and south along the southwestern coast. Farther south is the Stirling Range. Hammersley Range in the northwestern part of the state rises to 4,025 feet. For the boundaries of Western Australia see **AUSTRALIA** (colored map).

Much of the inland part of the state is a sandy wasteland. The Great Sandy Desert lies in the north, and the Great Victoria Desert stretches across the southern border from South Australia. The central part of the state is a high plain, or plateau, with an average elevation of 1,000 to 1,500 feet above sea level.

Western Australia has few important water areas. The largest rivers flow through the western part of the state and empty into the Indian Ocean. They include the Murchison, Gascoyne, Ashburton, and Fitzroy.

Climate. The central regions of Western Australia are hot and dry. Most of the great central region is unfit for farming or even for grazing. The southwestern part of the state has a mild climate, with warm, dry summers. But the yearly rainfall is heavy enough that many kinds of crops can be grown.

Natural Resources. Gold is the most important mineral wealth of the state. The chief gold fields are in the Kalgoorlie district 365 miles east of Perth. Soft coal is mined at Collie near Perth, and there is iron ore in the hills east of Perth. Great iron-ore deposits are found in the far northwest. Other mineral deposits include arsenic, silver, asbestos, and tin.

The most fertile regions of Western Australia lie in the southwestern part of the state near the city of Perth. Here are the chief farming and grazing lands.

Great forest areas are found also in the southwest. The giant eucalyptus, or gum trees, are one of the main sources of wealth. Beautiful wild flowers grow everywhere. Among these are many-colored and fantastically shaped orchids. Other scenic attractions are the natural caves which are found at the base of many hills. Tourists especially enjoy the tall timber, the curving beaches with snowy white sand and crystal-clear water, and the rugged hills.

The People and Their Work

Western Australia has an estimated population of only 488,348. This is fewer persons than live in the city of New Orleans. Nearly half the people of Western Australia live in areas near the capital city of Perth. Most of the others work in the gold fields, the timberlands, or the farm lands of the southwest.

Mineral products, especially gold, are the most important products of Western Australia. The chief crops include wheat, barley, hay, oats, and potatoes. Cattle and sheep are also raised in the southwestern and northwestern part of the state. Other farm occupations include dairying, poultry raising, and bee farming. Pearl fisheries in Western Australia account for much of the world's supply of pearl shell.

Transportation and Trade. The government of Western Australia owns over 4,000 miles of railroad. Rail lines link Western Australia with all the other states of the Australian Commonwealth. Most of Western Australia's foreign trade is carried on with Great Britain.

Cities. Perth is the capital and chief city of Western Australia. It is described under its own name in **THE WORLD BOOK ENCYCLOPEDIA**. The state has no other cities, and except for Kalgoorlie, no towns of much over 5,000 population. See **AUSTRALIA** (Cities).

Education and Progress. The people of Western Australia boast that their state education is free "from the



International News
Rebecca West, modern English writer

kindergarten to the university." All children must attend school until they reach the age of fourteen. The State Education Department gives free correspondence courses to persons who live in hard-to-reach parts of the state. The state university gives free schooling to qualified students. It is a small, up-to-date university which lies on the shores of the Swan River near Perth.

History and Government

The governor of Western Australia is appointed by the British king on the recommendation of his Western Australian Government. The head of the government is the Premier, who is assisted by a cabinet made up of ministers responsible to the lawmaking bodies. These bodies are the legislative assembly and the legislative council. Since 1893 members of the legislative assembly have been elected by popular vote of men and women over twenty-one years of age. In the case of the council, the franchise is restricted to homeowners or occupants.

Europeans first visited Western Australia during the 1600's, but the first British settlement was not made until 1826. Full colonization began in 1829, when Captain James Stirling founded the Swan River settlement and the towns of Perth and Fremantle. In 1901 Western Australia was one of the six original states to enter the Australian Commonwealth. G.S.C.

See also FLAG (color plate, British Commonwealth of Nations).

WESTERN CHURCH was a name given to the Roman Catholic Church after the Great Schism of the 800's. The name distinguishes the Roman Catholic Church from the Eastern, or Greek, Church, which does not recognize the Pope as the supreme head of the Christian Church. See also ROMAN CATHOLIC.

WESTERN COLLEGE FOR WOMEN is a privately controlled liberal arts school at Oxford, Ohio. The school offers B.A. and B.M. degrees. It was chartered as Western Female Seminary in 1853 and received its present name in 1904. Normal enrollment is about 250. P.E.H.

WESTERN ELECTRIC COMPANY. Every one of the 22,000,000 telephones which the Bell system maintains in the United States was manufactured at one of the giant plants of the Western Electric Company in Illinois and New Jersey. This company, which has three major plants — two in Chicago and one in Kearny, N.J. — is the world's largest manufacturer of electrical equipment. Its assets amount to more than \$500,000,000, and it does a yearly business of about \$100,000,000 in normal times. In addition to making telephone equipment, it makes telegraph, radar, television, and various electronic equipment.

The Western Electric Company is an outgrowth of the Gray and Barton Electric Manufacturing Company of Cleveland. This company was formed in 1869 by Enos M. Barton, a small electric and telegraph equipment manufacturer, and Elisha Gray, an inventor. They had a total capital of only \$500. The company expanded after obtaining the contract to manufacture equipment for the Western Union Telegraph Company, and moved to Chicago in 1870. It was reorganized as the Western Electric Manufacturing Company in 1872, with a capital of \$150,000. The Western Union Company owned a controlling interest. In 1881 the Bell

System bought Western Union's interest in the Western Electric Manufacturing Company. The company was then reorganized as the Western Electric Company of Illinois, with a capital of \$1,000,000. Western Electric became almost the exclusive manufacturer of Bell telephones. In 1924, when the American Telephone and Telegraph Company gained control of the Bell Telephone Company, the New York branch of Western Electric was made a separate corporation, called the Bell Telephone Laboratories. It was owned jointly by A.T. & T. and Western Electric Company. During World War II, Bell Telephone Laboratories led the nation in designing signal corps equipment, radar sets, range-finding devices, and other electronic equipment for war. R.D.P.

WESTERN EMPIRE. See ROMAN EMPIRE (beginning with the subhead, Restoration under Diocletian and Constantine).

WESTERN GREBE. See GREBE.

WESTERN HEMISPHERE. See HEMISPHERE.

WESTERN ILLINOIS STATE TEACHERS COLLEGE. See ILLINOIS STATE TEACHERS COLLEGE.

WESTERN ISLES. See HEBRIDES.

WESTERN KENTUCKY STATE TEACHERS COLLEGE. See KENTUCKY STATE TEACHERS COLLEGE.

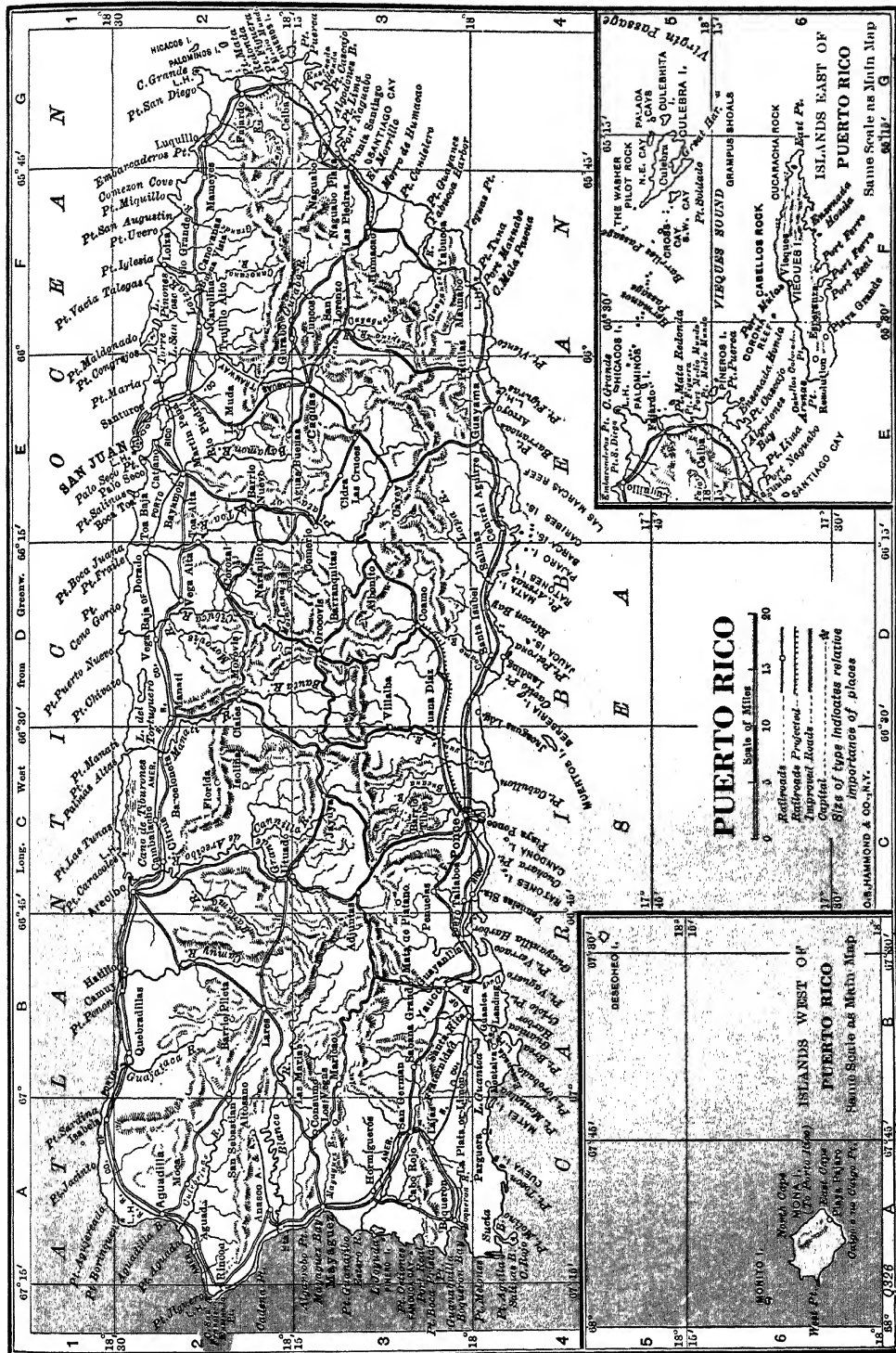
WESTERN MARYLAND COLLEGE is a coeducational, privately controlled college at Westminster, Md. It is affiliated with the Methodist Church, and is partially supported by the state. The school has departments of education, music, and art, in addition to the liberal arts courses. The college gave its first instruction in 1867. It has an average enrollment of about 600.

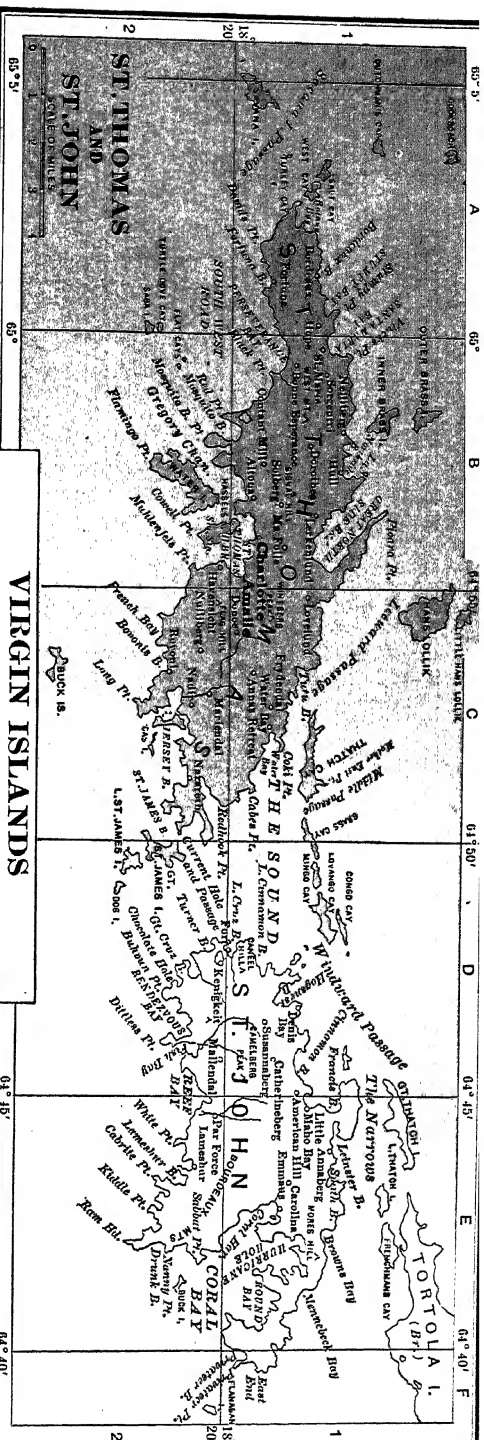
WESTERN MEADOW LARK is the state bird of Kansas, Montana, Nebraska, North Dakota, Oregon, and Wyoming. For an illustration of a meadow lark, see BIRD (color plate, Birds That Help the Farmer). See also MEADOW LARK.

WESTERN MICHIGAN COLLEGE OF EDUCATION is a state-controlled, coeducational institution at Kalamazoo, Mich. Courses are offered in teaching and pre-professional work. Graduate study is provided in collaboration with the University of Michigan. The college has a speech correction clinic and a psychoeducational clinic. It also offers work leading to degrees in nursing and in occupational therapy. Western was established in 1903. The average enrollment is about 2,400.

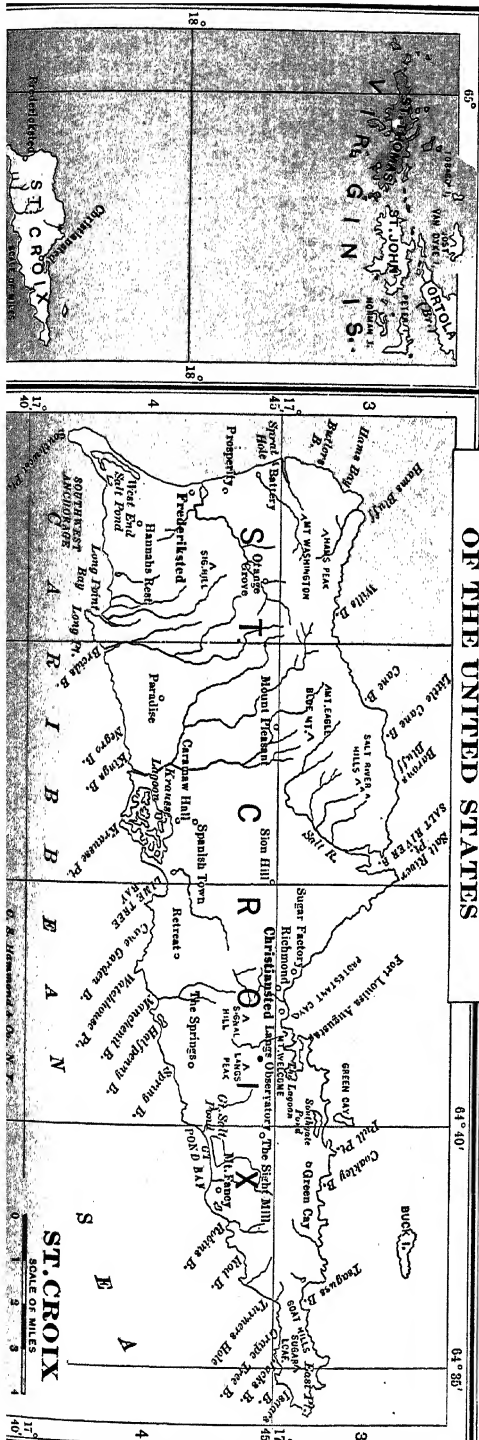
WESTERN NEWSPAPER UNION. This newspaper feature syndicate, also known as WNU, serves hundreds of small newspapers in the United States. The Western Newspaper Union was organized in Des Moines, Iowa, in 1880 by George A. Joslyn, W. E. Andrews, and W. A. Bunker. During the next thirty years it bought up about twenty other syndicates. It served the country newspaper field with features in the form of printed sheets called "ready-print." The Western Newspaper Union is the largest newspaper syndicate in the world in the number of newspapers using its various services. It is the only syndicate which supplies features through such varied means as printed pages, stereotype plates, mats, and manuscript copy. E.S.W.

WESTERN ONTARIO, UNIVERSITY OF, is a coeducational school at London, Ontario, Canada. It is privately supported, but receives some aid from Ontario and





VIRGIN ISLANDS OF THE UNITED STATES



the city of London. The school has faculties of arts, medicine, and public health, and is affiliated with a conservatory of music. It has six affiliated colleges. They are Assumption College (Roman Catholic), at Windsor; Waterloo College (Lutheran), at Waterloo; Ursuline College (Roman Catholic), at London; St. Peter's Seminary College of Arts (Roman Catholic), at London; Alma College (junior), at St. Thomas; and Huron College (Church of England theological), at London. The university was founded in 1878. It has an average enrollment of about 1,000 in London, and 500 in each of the other colleges.

WESTERN PROVINCES is a little-used term for that part of Canada which includes British Columbia and the prairie provinces of Alberta, Manitoba, and Saskatchewan.

WESTERN RESERVE. In 1662 King Charles II of England granted the colony of Connecticut a charter. This charter gave Connecticut title to lands which stretched westward from the Atlantic Ocean to the Pacific. In 1786 Connecticut gave to the new United States Government the great stretch of western land which it held under its original charter. But Connecticut kept a strip of land bordering on Lake Erie in Ohio. This strip was called the *Western Reserve*. It extended westward about 120 miles from the northwestern boundary of the state of Pennsylvania, and covered 3,667,000 acres. In 1795 and 1796 most of this territory was sold to the Connecticut Land Company for \$1,200,000. Connecticut used the money to set up a state school fund, and formally surrendered control of the territory in 1800.

The new land was surveyed, and settlers poured into the region at once. Later, this flourishing territory became part of the new state of Ohio. Today the Western Reserve University in Cleveland, Ohio, preserves the old name of the territory.

E. C. BAR.

WESTERN RESERVE UNIVERSITY is a privately endowed coeducational school at Cleveland, Ohio. It includes a liberal arts college, as well as schools of architecture, law, education, pharmacy, dentistry, medicine, applied social sciences, library science, and nursing, and a graduate school. Cleveland College is the university's downtown center. Western Reserve was founded as a men's college in 1826 at Hudson, Ohio. The average enrollment is about 10,000.

WESTERN UNION TELEGRAPH COMPANY is a commercial organization which sends telegrams, cables, night letters, day letters, serial telegrams, and radiograms to almost all parts of the world from almost anywhere in the world. The company began in 1851 as the New York and Mississippi Valley Printing Telegraph Company. The founders were Hiram Sibley, Samuel L. and Henry R. Selden, and Ezra Cornell, who later founded Cornell University. In 1856 the company absorbed several other telegraph companies under the name of Western Union.

Today Western Union has about 30,800 telegraph offices and agency stations. The company has over 235,000 miles of pole lines, and a total of more than 2,250,000 miles of telegraph wires and cables.

F. M. R.

WESTERN WALLFLOWER. See FLOWER (color plate, Mountain Flowers).

WESTFALEN. See WESTPHALIA.

WEST GOTH. See GOTH.

WEST HIGHLAND TERRIER. See DOG (color plate, Terriers).

WEST INDIES. The West Indies make up a long chain of islands which mark the boundary between the Caribbean Sea and the Atlantic Ocean. The islands stretch in a two-thousand-mile curve from the tip of Florida to the coast of Venezuela. The West Indies cover a land area of 91,123 square miles, and have a population of 13,861,483. Christopher Columbus gave the islands their name. He sighted them on his first voyage of exploration in 1492, and thought they were part of India.

The Land and Its Resources. The islands of the West Indies are very different in size, scenery, and natural resources. Many of the islands are the tops of ancient mountains which were plunged beneath the sea when part of the earth's surface sank. Other islands were built up by sand or coral deposits. Most of the West Indies have a tropical climate and tropical forms of plant life.

The West Indies are made up of three groups of islands, the Bahamas, the Greater Antilles, and the Lesser Antilles. The Bahamas are low, sandy islands which stretch from a point east of Florida to a point north of Haiti. The Greater Antilles stretch in a longer chain south of the Bahamas from northwest to southeast. The Lesser Antilles curve east and south from the Greater Antilles to form the farthest eastern boundary of the Caribbean Sea, and a chain off the northern coast of Venezuela. For the boundaries of the West Indies, see the colored map.

Many of the West Indies are possessions of the United States, Great Britain, The Netherlands, or France. The only independent countries in the island group are Cuba, Haiti, and the Dominican Republic. Haiti and the Dominican Republic share the island of Hispaniola. The United States governs Puerto Rico and some of the Virgin Islands. The possessions of Great Britain include the rest of the Virgin Islands, the Bahamas, Jamaica, Trinidad, and most of the Leeward and Windward islands. The chief Dutch colonies are Curacao and Aruba. The French islands include Martinique and Guadeloupe.

The People and Their Work. The islands of the West Indies are thickly populated. Most of the people are



Larry Keighley

A Farmer of the West Indies uses an ancient means of transportation to travel along a modern concrete motor highway.

descended from African Negroes, or are a mixture of Negro and white stocks. But the few white people who live in the islands rule everywhere except in Haiti, which is a Negro republic. Most of the people are very poor. Their chief work is farming or fruitgrowing. The most important products are sugar, cacao, tobacco, coffee, and various kinds of tropical fruits.

History. The story of the West Indies is full of tales of adventure, violence, and romance. During the 1500's, Spanish settlers founded colonies in most of the islands of the West Indies. They killed most of the Indians who lived in the islands, and began to bring in Negro slaves from Africa. The West Indies soon became a flourishing center of the slave trade.

The French and British established colonies in the islands in the 1600's, and Dutch settlers soon followed. During the 1600's, the West Indies were the refuge of the famous pirates of the Spanish Main. Gradually Spain lost all its possessions in the West Indies. The United States gained possession of Puerto Rico in 1898, after a war with Spain, and bought the Virgin Islands from Denmark in 1917.

In 1940 the United States leased five sites in British West Indies colonies to use as naval and air bases. American bases had already been built in Puerto Rico, Cuba, and the Virgin Islands. These West Indies bases guard the eastern entrance to the Panama Canal. C.B.A.

Related Subjects. The reader is also referred to:

Antilles	Dominican Republic	Martinique
Bahamas	Guadeloupe	Puerto Rico
Barbados	Haiti	Trinidad
Cuba	Jamaica	Virgin Islands
Curaçao	Leeward Islands	Windward Islands

WEST INDIES, DANISH. See VIRGIN ISLANDS.

WESTINGHOUSE, GEORGE (1846-1914), was an American engineer and manufacturer who invented the Westinghouse air brake for trains. He also introduced alternating current for electric lights, developed and manufactured steam turbines, and pioneered in the use of electric power for railways.

Westinghouse was born in Central Bridge, N.Y. As a boy he worked in his father's factory. Westinghouse was interested in machinery and inventions, and one of his first inventions was a railway frog. This device made it possible for a train to pass from one track to another. Later he became interested in brakes and made numerous experiments with practical uses for compressed air.

In 1869 Westinghouse patented the air brake. The brake was immediately successful and Westinghouse organized a company to manufacture it. During his lifetime, Westinghouse organized sixty companies and patented almost 400 inventions. E.Y.

See also AIR BRAKE.

WESTINGHOUSE ELECTRIC CORPORATION. This

great company produces electrical equipment, ranging in size from small household irons to huge 18,000-horsepower motors. In addition, divisions of Westinghouse Electric produce a great variety of nonelectrical equipment, such as gas turbines, the famous Westinghouse air brakes, and locomotives.

The main plants of the Westinghouse Electric Corporation are located in Pittsburgh, and branch plants are scattered throughout the world. The firm was organized as the Westinghouse Electric and Manufacturing Company in 1886.

During World War II, Westinghouse laboratories developed a number of new weapons. A 4,000,000-volt atom smasher which the company owned was used in research on the atomic bomb.

In 1945 Westinghouse Electric and Manufacturing Company officers voted to change the company's name to the Westinghouse Electric Corporation. R.D.P.

WEST LIBERTY STATE COLLEGE is a coeducational school at West Liberty, W.Va. Degrees are granted in secondary and elementary education, liberal arts and sciences, and dental hygiene. West Liberty operates one of the few dental hygiene training schools in the United States. The school was chartered in 1837. The average enrollment is about 300. P.N.E.

WESTMINSTER, STATUTE or TREATY OF. See CANADA, GOVERNMENT OF (International Relations).

WESTMINSTER ABBEY is a great national church which stands near the Houses of Parliament in London. This is one of the most famous churches in the world and one of the most beautiful in England. Its official name is the Collegiate Church of Saint Peter. Its name of Abbey comes from the fact that it was the church of an ancient monastery, parts of which still exist.

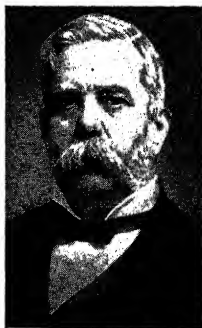
Westminster Abbey has been the scene of many great events in English history. All the English rulers from the time of William the Conqueror, except Edward V and Edward VIII were crowned there. In the chapel of Edward the Confessor is the old Coronation Chair which dates from the time of Edward I (1239-1307). See CORONATION.

Burial in Westminster Abbey is one of the greatest honors England can give. Many kings and queens are buried in the chapel of Henry VII. Statesmen and other great men of England are buried in other parts of the Abbey. The bodies of many of England's greatest poets lie in the Poet's Corner.

Westminster became the seat of a bishop in 1539. This act made the Abbey a cathedral. But only one bishop ever served in Westminster. Since the time of Queen Elizabeth the head of the Abbey has been a dean.

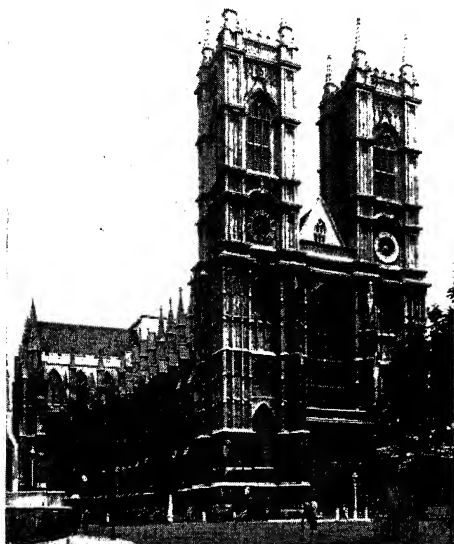
Edward the Confessor built a church on the site of the Abbey between 1050 and 1065, and parts of this church still remain. But the main part of the present building was begun in 1245 by Henry III. In the 1500's Henry VII added the beautiful chapel which bears his name. The towers were completed in 1739.

The Abbey is one of the best examples of French Gothic architecture in England. The floor plan is in the shape of a Latin cross. The total length of the church is 513 feet. The crossarms, or *transepts*, are 203 feet long. The main hall, or *nave*, is 98 feet wide and 102 feet high.



Brown Bros.

George Westinghouse built a great industry by his inventive genius.



British-Combine

Westminster Abbey, in London, is a shrine of the British Empire and the resting place of its honored dead.

The twin towers on the west are 225 feet high. The square central tower barely rises above the roof.

Around the Abbey are cloisters which date from the 1200's and 1300's. The chapter house was built in the 1200's. West of the main cloisters is the famous Jerusalem Chamber, dating from the 1300's.

During one of the worst air raids on London in World War II, Westminster Abbey was severely damaged. The roof of the lanterne, or central part of the Abbey, was burned out and collapsed. The Deanery was destroyed completely. The cloisters were badly damaged, and some damage was done to the Henry VII chapel. Restoration was begun after the war.

WESTMINSTER CHOIR is one of the most famous choral organizations in the United States. It was founded in 1921 by John Finley Williamson, in connection with the Westminster Choir School (now College) in Princeton, N.J. Under Finley's direction, the Westminster Choir has toured widely in the United States, giving programs of great choral works of the past and present. In 1929 and 1934 it sang in Europe.

WESTMINSTER COLLEGE is a liberal arts school for men at Fulton, Mo. It is controlled by the Presbyterian Church. Courses prepare students for advanced study in medicine, law, engineering, teaching and the ministry. The school was founded in 1851, and has an average enrollment of more than 300. D.B.G.

WESTMINSTER COLLEGE is a coeducational liberal arts college at New Wilmington, Pa. It is controlled by the United Presbyterian Church. In addition to liberal arts, it offers business and secretarial science courses and has a conservatory of music. The school was chartered in 1852. The average enrollment is about 700. R.F.G.

WESTMINSTER HALL is a building connected with the Houses of Parliament in London. Originally, it was the great hall of the Palace of Westminster, where the rulers of England held court for almost 500 years. Many great events in English history took place in the Hall. Sir Thomas More, Lady Jane Grey, the Earl of Strafford, and Warren Hastings stood trial here. Charles I was condemned to death in this hall, and Cromwell was installed as Lord Protector of England in Westminster. The Hall was built by William Rufus in 1099. It is 290 feet long, 68 feet wide, and 92 feet high. Its most interesting architectural feature is its elaborately carved wood ceiling. During the air raids of World War II, the roof of Westminster Hall was damaged by fire but was later repaired. T.F.H.

WESTMINSTER SCHOOL is one of the oldest public schools of England. It was founded as St. Peter's College at Westminster, London, in 1540 by Henry VIII. The school gained a reputation as one of the leading English schools during the headmastership of Henry George Liddell in the middle 1800's. The Public Schools Act of 1868 broke the long connection of the school with Westminster Abbey. L.L.K.

WESTMOUNT, Quebec (population 26,047), is a residential suburb on the western edge of Montreal. It is noted for its fine homes and its excellent public library. Westmount was incorporated as a town in 1873 and became a city in 1908. When first settled, it was known as the village of Notre Dame de Grace. J.A.D.

WESTPHALIA, *west FAY lih ah*, is a Prussian province of Germany. It lies in the western part of the country, just east of The Netherlands and south of the Prussian province of Hanover. The name *Westphalia*, or *Westfalen* in German, means *western plain*. The most thickly settled part of Westphalia is the Ruhr district. See RUHR.

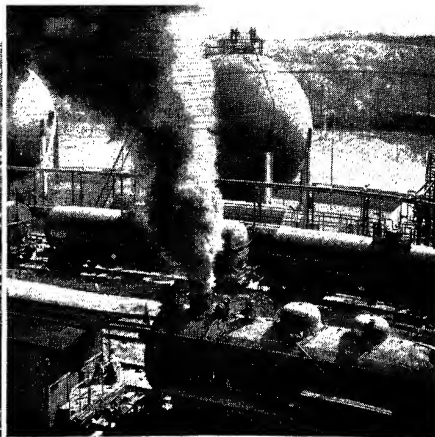
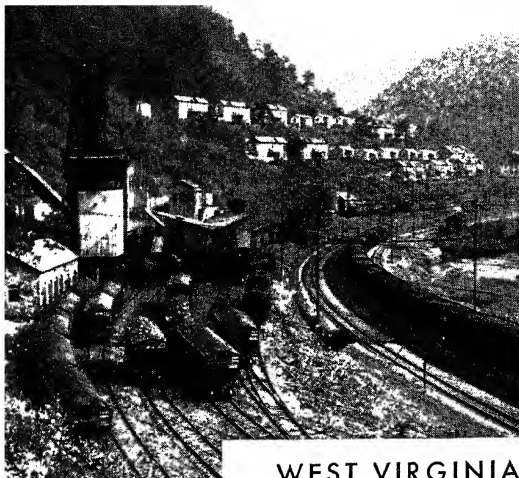
The Land and Its Resources. The province covers an area of 7,809 square miles. It is a little larger than the state of New Jersey. Westphalia has a population of about 4,811,000.

The land rises from a flat plain near the northeastern boundary to a region of high hills in the southeast. The chief rivers are the Ems and the Ruhr. The Dortmund-Ems Canal connects the city of Dortmund with the Ems River, and is one of the important German waterways.

Westphalia produces more coal than any other Prussian province. It also has rich deposits of iron, zinc, copper, lead, salt, and building stones. About two fifths of the land is taken up by farms, gardens, and vineyards. The chief crops include rye, oats, potatoes, wheat, and grapes. The chief industries are mining, metal refining, and manufacturing.

History. Westphalia was once part of the Duchy of Saxony. When this duchy broke up in the late 1100's, the name Westphalia was given to a region ruled by the Archbishop of Cologne. In 1648 an important peace treaty, called the Peace of Westphalia, was signed at Münster, the capital of Westphalia. This treaty ended the Thirty Years' War. Prussia gained control of Westphalia by the terms of the Treaty of Vienna (1814-1815). The cities and farms of Westphalia were heavily damaged in World War II. T.Z.

WEST POINT, N.Y. See UNITED STATES MILITARY ACADEMY.



WEST VIRGINIA THE PANHANDLE STATE

WEST VIRGINIA is named for the state of Virginia, of which it was once a part. It is called **THE PANHANDLE STATE** because of its narrow strip of land in the northwest, and because of the eastern panhandle which lies between Virginia and Maryland. It is also called **THE MOUNTAIN STATE** because its land is so rugged. West Virginia is said to be the most northern of the southern states, the most southern of the northern states, the most eastern of the western states, and the most western of the eastern states. A long arm of the state reaches to Harpers Ferry, fifty miles from Washington, D.C. Bluefield, in Mercer County, is twenty-five miles farther south than Richmond, Va. The western border of the state extends almost as far west as Columbus, in central Ohio. The northern panhandle reaches farther north than Pittsburgh, Pa.

The state motto, "mountaineers are always free," surely fits the people of West Virginia. The tradition of hardy independence and love of liberty has flourished long and well here. In 1771, before the Revolution, the settlers petitioned the King of England for the right to establish a separate government. When Virginia seceded from the Union, the settlers of its western counties objected strongly, as they were loyal to the Union. The sturdy farmers and businessmen of the region decided to govern themselves. West Virginia was admitted to the Union as a state in 1863. This was the only change made in the map of the United States during the War between the States.

West Virginia is sometimes called "The Coal Bin of the World." It has huge deposits of bituminous (soft) coal, and mines more coal than any other state. Large amounts of natural gas, salt brine, limestone, pottery clay, and petroleum are produced. The abundance of raw materials and cheap fuels has made possible Wheeling, the "Steel City," and other great manufacturing centers such as Weirton, Charleston, and Huntington.

The beautiful green Kanawha Valley has been a great pathway of settlement and trade since earliest days. The magic of science has changed this valley into the center of the chemical industry of the United States. The resources of the valley — coal, petroleum, gas, salt, water, and air — are used to make chemicals for producing various synthetic materials as fine as silk, as elastic

as rubber, stronger than steel, and as easily molded as clay. During World War II, when the United States could no longer buy war materials from foreign markets, the nation turned to this valley where magic is worked with plentiful natural resources. The first war plant to supply synthetic rubber, the largest in the world, was built here. An ordnance plant made more than 150,000 guns for the Navy.

West Virginia is not entirely an industrial state. There are many farms in the fertile lowlands of the Ohio and the Potomac, and in the valleys between the mountains. Only New York and Pennsylvania grow more buckwheat than West Virginia, and the state holds a high place in the growing of choice apples and peaches. The forests add to the wealth of the state. West Virginia is a leader in the production of cherry lumber.

The Land and Its Resources

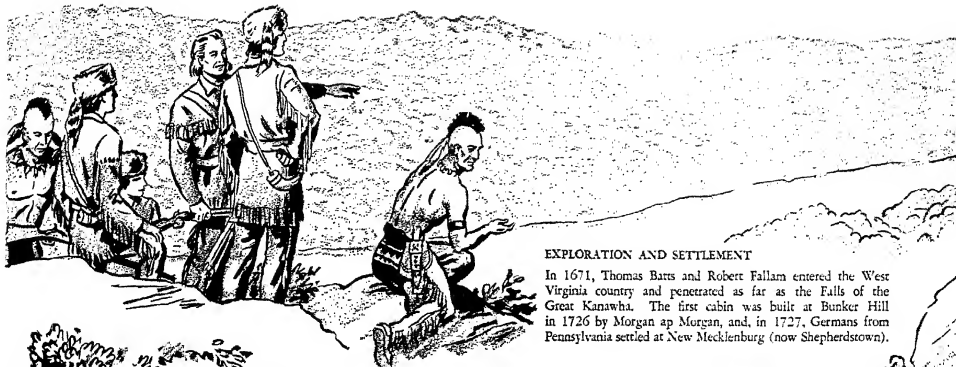
Extent: Area, 24,181 square miles (91 square miles of which are inland water); fortieth in size among the states. *Greatest length*, 225 miles; *greatest width*, 200 miles.

Physical Features: *Mountain range*, Allegheny. *Chief peaks*, Allegheny (4,017 feet), Angels Rest (3,600 feet), Calders Knob (3,256 feet), East River (3,480 feet), Flat Top (3,566 feet), North Fork (3,582 feet), Red Lick (3,533 feet), Shenandoah (3,450 feet), Spruce Knob (4,860 feet). *Elevation*, highest, Spruce Knob, Pendleton County, 4,860 feet above sea level; lowest, along the Potomac River in Jefferson County, 240 feet above sea level. *Chief rivers*, Kanawha (chief tributaries, New, Gauley, Greenbrier, and Guyandotte); Monongahela (chief tributaries, Cheat, Tygart, and West Fork), Big Sandy, Little Kanawha, and south branch of the Potomac. *Chief waterfall*, Blackwater.

Climate: *Temperature*, average annual 53° Fahrenheit; average summer, 71.5° F.; average winter, 33.6° F.; lowest on record, -37° F. at Lewisburg (Dec., 1917); highest on record, 112° F. at Moorefield (Aug., 1930) and Martinsburg (July, 1936). *Precipitation*, average annual, 43.36 inches; average Apr. 1 to Sept. 30, 23.69

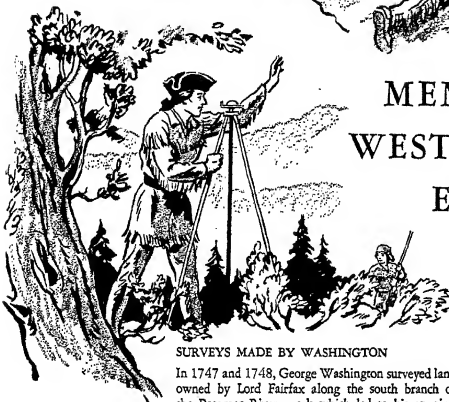
Pronunciation Guide

Buckhannon <i>buk HAN un</i>	Monongalia <i>MOH nahh</i>
Follansbee <i>FAHL anz bee</i>	GAY lih ah
Guyandotte <i>GY an DOT</i>	Scioto <i>sy O toh</i>
Kanawha <i>ka NAW wah</i>	Tygart <i>TI gert</i>



EXPLORATION AND SETTLEMENT

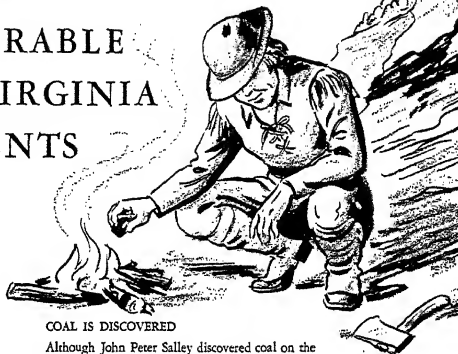
In 1671, Thomas Batts and Robert Fallam entered the West Virginia country and penetrated as far as the Falls of the Great Kanawha. The first cabin was built at Bunker Hill in 1726 by Morgan ap Morgan, and, in 1727, Germans from Pennsylvania settled at New Mecklenburg (now Shepherdstown).



SURVEYS MADE BY WASHINGTON

In 1747 and 1748, George Washington surveyed land owned by Lord Fairfax along the south branch of the Potomac River, work which led to his appointment as a public surveyor. Along the frontier, he built more than twenty outposts for protection against Indians, but only Fort Ashby still stands.

MEMORABLE WEST VIRGINIA EVENTS



COAL IS DISCOVERED

Although John Peter Salley discovered coal on the Coal River in 1742, it did not take the place of wood as fuel for steam engines until 1820. In succeeding decades, it was used for railroad locomotives, and was also transported to market by rail and by way of the Great Kanawha and Monongahela rivers.



FIRST NATURAL GAS WELL

At Burning Spring, Kanawha County, in 1775, a pioneer saw gas bubbles rising to the surface and made the discovery that gas would burn when lit. Forty years later, while drilling for salt near Charleston, James Wilson brought in the first natural gas well in the United States. In 1841, William Tompkins found natural gas could be burned as fuel to evaporate brine, the first time it was used for commercial purposes in the United States.

THE RAID ON HARPER'S FERRY

On October 16, 1859, John Brown, an abolitionist, with the help of twenty-two followers, seized the Government arsenal at Harper's Ferry. The slaves did not rise against their masters as Brown had hoped. He was taken prisoner, tried at Charles Town, convicted of treason, and hanged.



FIRST RURAL FREE DELIVERY

From Charles Town, Hometown, and Uvilla in 1896 rural free delivery postal service was tried out for the first time. These towns were selected because William L. Wilson, the Postmaster General at the time, was a West Virginian.

inches; average Oct. 1 to Mar. 31, 19.67 inches. *Snow-fall*, average annual, 34 inches, ranging from about 20 inches in the south to over 70 inches in the mountainous areas of the northwest.

Location, Size, and Surface Features. West Virginia is the only South Atlantic state which has no seacoast. It is also one of the most irregularly shaped states in the Union. The state has no sharply jutting mountains or great stretches of level plains, as in many states. Instead, wide valleys rise gently to rolling, wooded foothills and flat-topped mountains which are broader than they are high. West Virginia is about two thirds the size of Virginia, and less than one sixth as big as California. But it is larger than any of the New England states except Maine. West Virginia has the highest average elevation of any state east of the Mississippi River. For the boundaries of the state, see the colored map.

West Virginia may be divided into four natural regions, the Ohio River Lowland, the Allegheny Plateau, the Allegheny Highlands, and the Potomac River Basin.

The *Ohio River Lowland* lies along the western border. It is an area of rolling fertile plains, and contains some of the best farm land of the state. The rich bottom lands are well suited to the growing of wheat, oats, and other grains. Native bluegrass, which is the best pasture grass, grows in many parts of the valley, and the raising of livestock is a profitable occupation. The Panhandle

rises 585 feet above the stream. The Highlands region is the most heavily forested area in the state, and large areas have been set aside as state and national forest preserves. Fertile valleys, which are suitable for farming, lie among the mountains in the southeastern section. This region contains the largest limestone deposits in the state, and also iron ore and coal.

The *Potomac River Basin*, which makes up the eastern Panhandle, is low, well-watered, and extremely fertile. Corn, wheat, rye, and oats are among the chief products of its farms. Many apple and peach orchards produce several million bushels of fruit every year. Limestone lies under much of the region.

Rivers and Lakes. Most of the rivers of West Virginia begin as swift streams in the highlands. They tumble in falls and cascades down the mountainsides, where they carve deep valleys on their way to the Ohio or the Potomac. The broad, navigable Ohio lies along the northwest border of the state. This river has been of great value as a commercial water route since earliest days. It provides a route to the Mississippi, and from there to the Gulf of Mexico.

The Kanawha is the largest branch of the Ohio. It rises in the mountains of North Carolina and flows across West Virginia through the rich coal and timber regions. The Potomac then flows along the northeastern boundary of the state to the beautiful gap in the mountains at Harpers Ferry, where the Shenandoah River joins it.

These rivers, plus many mountain torrents and springs, furnish a vast amount of power. West Virginia ranks sixth among the states east of the Rockies in the supply of water power that could be developed. One of the largest power dams is on the Cheat River near the Pennsylvania line.

There are no large lakes in the state, although several mountain streams have been dammed to form small artificial lakes.

Climate. The temperature varies considerably because of the wide range in elevation, but the climate is severe only in the high mountains. The summers are warm in the valleys, and mild in the mountains, where temperatures as high as 90° F. are rare. Winters are mildest in the valleys, but even in the highlands there are few long or severe cold spells.

Rainfall is well distributed and is greatest during the growing season. The heaviest rainfall occurs in the mountain regions, where the clouds are forced to rise and give up their moisture. The lightest rainfall is in the valley of the South Branch of the Potomac, where high ridges to the east cut off moisture-laden winds from the Atlantic. Thick fogs are common in the valleys and lowlands, especially in the Kanawha River Valley, because of the large amount of moisture in the air. The prevailing winds are from the south and from the west.

Natural Resources. Few areas of similar size have as great wealth and variety of natural resources as West Virginia. These resources include fertile soils, millions of acres of woodlands, many minerals, and abundant wild life.

Many kinds of trees grow in the state. The higher mountains are covered with white pine, hemlock, and spruce, and the lower slopes are covered with oak,



section is in the north. It is a narrow strip of hilly land jutting between Ohio and Pennsylvania. Nature has given this region vast deposits of coal, petroleum, and natural gas, and it is one of the greatest manufacturing areas in the state.

The *Allegheny Plateau* rises gradually from the eastern part of the lowland region. It is an ancient tableland which has been carved into valleys and rounded hills by the action of running water. The chief farming activities are dairying, the grazing of livestock, and the growing of grain and general farm crops. Mineral resources include coal, natural gas, petroleum, limestone, sandstone, and shale.

The *Allegheny Highlands* are a region of great natural beauty, with lofty mountains and ridges, and deep gorges. Rocky cliffs tower above the canyons cut by rushing streams. At Hawk's Nest, where the New River dashes through its wildest gorge, the sheer wall of rock

WEST VIRGINIA

Total Population 1,901,974

Accoville, (C5).....1,075	Blue Sulphur Springs, (E5)..... 63	Coketon, (C2)..... 430	Fenwick, (E4)..... 390	Hanover, (C5)..... 250
Acme, (D4)..... 667	Bolair, (F4)..... 60	Colcord, (D5)..... 648	Ferguson, (B4)..... 100	Harding, (C3)..... 185
Adrian, (F3)..... 605	Bolivar, (L2)..... 628	Coldwater, (E2)..... 130	Ferrisburg, (B4)..... 142	Hartman, (C3)..... 184
Albert, (G2)..... 825	Boomer, (D4)..... 1,751	Colliers, (C5)..... 626	Fireco, (D5)..... 1,161	Harper, (D5)..... 170
Albright, (G1)..... 334	Bordenland, (B5)..... 229	Copen, (E3)..... 61	Fire Creek, (D5)..... 388	Harpers Ferry, (L2)..... 665
Alderson, (E5)..... 1,493	Bowden, (G3)..... 144	Corinne, (D5)..... 612	Flat Top, (D5)..... 66	Harrisville, (E2)..... 1,338
Alexander, (F3)..... 310	Bowen, (C4)..... 795	Corinth, (H2)..... 132	Flat Woods, (E3)..... 308	Hartford, (C2)..... 467
Alkol, (C4)..... 208	Bowmont, (C4)..... 138	Cornwallis, (D2)..... 160	Flemington, (F2)..... 690	Harts, (B4)..... 144
Alma, (E2)..... 223	Boyer, (G3)..... 147	Cottageville, (C3)..... 253	Fletcher, (C3)..... 90	Harvey, (D5)..... 188
Alpena, (C3)..... 122	Bradshaw, (C6)..... 1,475	Cove Gap, (B4)..... 70	Follansbee, (K5)..... 4,834	Havaco, (C6)..... 831
Alpoca, (D5)..... 250	Bramwell, (D6)..... 1,494	Cowen, (E4)..... 539	Folsom, (E2)..... 236	Hazelton, (G1)..... 100
Alton, (F3)..... 399	Bradywine, (H3)..... 350	Coxs Mills, (E2)..... 43	Forest Hill, (E5)..... 95	Headsville, (J2)..... 179
Alum Bridge, (E2)..... 253	Bridgeport, (F2)..... 1,581	Craigsville, (E4)..... 145	Fort Ashby, (J2)..... 933	Heaters, (E3)..... 60
Alum Creek, (C4)..... 184	Bristol, (F2)..... 265	Cranberry, (D5)..... 716	Fort Branch, (C5)..... 1,233	Hebron, (D2)..... 47
Alvon, (F5)..... 70	Brohard, (D2)..... 489	Crawford, (F3)..... 40	Fort Gay, (A4)..... 645	Hedgesville, (K1)..... 403
Alvy, (E2)..... 135	Brook, (E5)..... 189	Crawley, (E3)..... 200	Fort Seybert, (H3)..... 148	Helvetia, (F3)..... 56
Amboy, (G2)..... 83	Brosius, (K1)..... 116	Creston, (D3)..... 203	Fort Spring, (E5)..... 148	Hempfield, (C6)..... 315
Amegale, (D5)..... 948	Brownland, (C4)..... 188	Crow Summit, (C3)..... 50	Foster, (C4)..... 230	Henderson, (B3)..... 398
Amherstdale, (C5)..... 2,910	Brown, (F2)..... 450	Crum, (B5)..... 313	Four States, (F2)..... 263	Hendricks, (C2)..... 539
Amma, (D3)..... 58	Brown, (F2)..... 450	Crystal, (D6)..... 530	Frame, (C3)..... 110	Henlawson, (B5)..... 1,387
Anawalt, (D6)..... 1,366	Brown, (F2)..... 450	Cucumber, (C6)..... 1,189	Franketown, (E3)..... 343	Hepzibah, (F2)..... 519
Anmoore, (F2)..... 1,173	Bruceton Mills, (G1)..... 176	Culloden, (B4)..... 161	Frankford, (F5)..... 123	Herndon, (D5)..... 720
Ansted, (D4)..... 1,422	Brushy Run, (H3)..... 225	Cuzzart, (H1)..... 89	Franklin, (H3)..... 613	Hico, (D4)..... 188
Antioch, (H2)..... 66	Buckhannon, (F3)..... 4,450	Cyclone, (C5)..... 84	Fraziers Bottom, (B3)..... 86	Highcoal, (C5)..... 602
Apple Grove, (B3)..... 55	Bud, (D5)..... 466	Dallas, (K5)..... 525	Freeman, (D6)..... 1,136	Highland, (D2)..... 50
Arcola, (F4)..... 96	Buffalo, (C3)..... 338	Daniels, (D5)..... 182	French Creek, (F3)..... 112	High View, (K2)..... 66
Arden, (G2)..... 200	Bunker Hill, (K2)..... 293	Danville, (C4)..... 417	French Creek, (F3)..... 112	Hillsboro, (F4)..... 224
Arnett, (D5)..... 183	Burlington, (J2)..... 301	Davis, (H2)..... 1,454	Frenchton, (F3)..... 163	Hilltop, (D5)..... 614
Arnoldsburg, (D3)..... 100	Burning Springs, (D2)..... 251	Davisville, (C2)..... 115	Friendly, (D1)..... 148	Hinton, (E5)..... 5,815
Arthurdale, (G1)..... 860	Burnsville, (E3)..... 851	Davy, (C6)..... 1,402	Frost, (G4)..... 60	Holidsays Cove, (K5)..... 6,137
Asbury, (E5)..... 42	Burnt House, (D2)..... 200	Dawes, (D4)..... 533	Gallipolis Ferry, (B3)..... 141	Hollywood, (F5)..... 50
Asco, (C6)..... 592	Burnt House, (D2)..... 200	Dawson, (E5)..... 119	Galloway, (F2)..... 980	Hominy Falls, (E4)..... 188
Asford, (C4)..... 116	Burnwell, (D4)..... 919	Decota, (D4)..... 671	Gandeville, (D3)..... 150	Hookersville, (E4)..... 40
Athens, (E6)..... 682	Burton, (F1)..... 110	Deer Run, (H3)..... 136	Gar Mills, (F5)..... 326	Horner, (F3)..... 189
Auburn, (E2)..... 168	Byrnside, (C4)..... 320	Delbarton, (B5)..... 105	Garretts Bend, (C4)..... 44	Horse Shoe Run, (G2)..... 120
Augusta, (J2)..... 233	Cairo, (D2)..... 532	Dellslow, (G1)..... 187	Gary, (C6)..... 1,325	Housesville, (G2)..... 230
Aurora, (C2)..... 400	Caldwell, (F6)..... 176	Diamond, (C4)..... 200	Gasaway, (E3)..... 1,429	Hubball, (B4)..... 225
Avondale, (C6)..... 341	Camden, (E2)..... 121	Diane, (F3)..... 122	Gauley Bridge, (D4)..... 937	Hundred, (E1)..... 706
Baculus, (E5)..... 300	Camden on Gauley, (E4)..... 373	Dille, (E4)..... 301	Gauley Mills, (E4)..... 82	Huntersville, (G4)..... 313
Baileysville, (C5)..... 300	Cameron, (E1)..... 1,998	Dingess, (B5)..... 301	Gay, (C3)..... 255	Huntington, (A4)..... 78,836
Balsden, (C5)..... 41	Camp Creek, (D5)..... 66	Dixie, (D4)..... 55	Genoa, (B4)..... 80	Hurricane, (C4)..... 1,103
Baker, (J2)..... 63	Canebrake, (C6)..... 585	Dola, (F2)..... 220	Gerrardstown, (K2)..... 260	Huntsville, (G3)..... 308
Bakerton, (L2)..... 278	Canfield, (E3)..... 123	Dorothy, (D5)..... 1,042	Ghent, (D5)..... 589	Jaeger, (C6)..... 96
Bald Knob, (C5)..... 426	Canvas, (E4)..... 40	Dott, (D6)..... 98	Giatto, (D6)..... 1,119	Independence, (G2)..... 1,175
Ballard, (E6)..... 40	Capon Bridge, (K2)..... 201	Dry Creek, (D5)..... 66	Gilbert, (C5)..... 490	Ingleisle, (D6)..... 20
Bancroft, (C3)..... 111	Capon Springs, (K2)..... 88	Dryfork, (H3)..... 60	Gilmer, (E3)..... 255	Institute, (C4)..... 622
Barboursville, (B4)..... 1,550	Captina, (K6)..... 61	Duck, (E3)..... 70	Given, (C3)..... 253	Inwood, (K2)..... 230
Bardane, (L2)..... 83	Carbon, (D4)..... 323	Duffy, (F3)..... 61	Glady, (G3)..... 123	Itamond, (D5)..... 1,091
Barnabus, (C5)..... 1,179	Cascade, (G1)..... 241	Dunbar, (C4)..... 5,266	Glen, (D4)..... 213	Ivydale, (D3)..... 236
Barrackville, (F1)..... 962	Cashmere, (E6)..... 60	Duncan, (C5)..... 150	Glen Dale, (E1)..... 1,348	Jacksonburg, (E1)..... 385
Bartow, (G3)..... 61	Cass, (C4)..... 597	Dundon, (D4)..... 78	Glen Daniel, (D5)..... 270	Janet Lee, (F2)..... 505
Bayard, (H2)..... 585	Cassville, (F1)..... 1,105	Dunmore, (G4)..... 63	Glen Easton, (K6)..... 604	Jefferson, (C5)..... 1,330
Beards Fork, (D4)..... 953	Catawba, (F1)..... 100	Dunns, (D5)..... 533	Glen Ferris, (D4)..... 694	Jessie, (C5)..... 2,151
Beckley, (D5)..... 12,852	Cedar Grove, (D4)..... 1,411	Durbin, (G3)..... 533	Glen Hayes, (D5)..... 1,280	Keokuk, (D6)..... 180
Bedington, (L1)..... 56	Cedarville, (E3)..... 188	Eastbank, (B4)..... 212	Glen Hedrick, (D5)..... 639	Kegley, (D6)..... 313
Beechbottom, (K5)..... 1,128	Center Point, (E2)..... 236	East Lynn, (D4)..... 601	Glen Hope, (D5)..... 1,026	Kellyville, (E6)..... 65
Beeson, (D6)..... 142	Centralia, (E3)..... 89	East Rainelle, (E5)..... 1,515	Glen White, (D5)..... 1,026	Kempton, (G2)..... 589
Belgrove, (C3)..... 94	Central Station, (E2)..... 616	Eccles, (D5)..... 2,186	Glenwood, (B3)..... 168	Kenna, (C3)..... 125
Belington, (F2)..... 1,993	Century, (F2)..... 576	Eckman, (C6)..... 1,817	Glovergap, (F1)..... 46	Kenova, (A4)..... 3,902
Belle, (C4)..... 264	Ceredo, (B4)..... 1,212	Edgerton, (B5)..... 66	Goodwill, (D6)..... 616	Kerens, (G2)..... 811
Bellefonte, (D2)..... 287	Chapel, (E3)..... 99	Edwight, (C5)..... 1,294	Gorman, (H2)..... 489	Kermitt, (B5)..... 90
Belva, (D4)..... 212	Chapmanville, (B5)..... 324	Egdon, (G2)..... 180	Grafton, (G2)..... 7,431	Kettle, (D3)..... 60
Bemis, (G3)..... 299	CHARLESTON, (D4)..... 67,914	Elbert, (C6)..... 977	Graben Station, (E5)..... 89	Keyser, (J2)..... 6,177
Bembush, (G2)..... 616	Charles Town, (L2)..... 92,266	Elizabeth, (D2)..... 685	Grandview, (D5)..... 163	Keystone, (D6)..... 2,942
Bens Run, (D2)..... 163	Charmco, (E4)..... 73	Elk Garden, (H2)..... 342	Grantsville, (D3)..... 1,052	Kieffer, (E5)..... 39
Benswood, (K5)..... 3,608	Chattahoo, (B5)..... 1,570	Elkhorn, (D6)..... 1,323	Grant Town, (F1)..... 2,051	Killmarney, (D5)..... 814
Berea, (E2)..... 143	Chelvan, (C4)..... 1,397	Elkins, (G3)..... 8,133	Grassy Meadows, (E5)..... 80	Kilsyth, (D5)..... 637
Bergoo, (F4)..... 731	Cherry Run, (K1)..... 173	Elkview, (C4)..... 742	Great Cacapon, (K1)..... 1,052	Kimball, (C6)..... 1,580
Berkeley Springs, (K1)..... 1,145	Chester, (L4)..... 3,805	Ellkwater, (G3)..... 113	Green Bank, (G4)..... 90	Kincheloe, (E2)..... 88
Berwind, (C6)..... 2,605	Christian, (C5)..... 508	Ellamore, (F3)..... 330	Green Sulphur Springs, (E5)..... 81	Kinross, (D5)..... 1,345
Bethany, (K5)..... 410	Cinco, (D4)..... 234	Ellenboro, (D2)..... 277	Greenville, (C4)..... 150	Kingswood, (G2)..... 1,676
Beverly, (G3)..... 484	Cinderella, (B5)..... 530	Elmira, (E3)..... 43	Greewood, (E2)..... 146	Kirk, (B5)..... 40
Bickmore, (D4)..... 44	Clear Creek, (D5)..... 798	Emoryville, (H2)..... 813	Greer, (G1)..... 148	Kistler, (C5)..... 1,061
Big Chimney, (C4)..... 175	Cleveland, (D3)..... 1,200	English, (C6)..... 43	Griffithville, (B4)..... 300	
Big Creek, (B5)..... 500	Clelandin, (F3)..... 41	Enterprise, (F2)..... 858	Grimms Landing, (C3)..... 80	
Big Four, (C6)..... 708	Clifton, (B3)..... 88	Erbacon, (E3)..... 179	Guckan, (C5)..... 200	
Big Isaac, (E2)..... 120	Clifton Mills, (G1)..... 100	Esksdale, (C4)..... 1,146	Hacy Valley, (F3)..... 178	
Big Otter, (D3)..... 42	Clintonville, (E1)..... 56	Ethel, (C5)..... 1,625	Hall, (F2)..... 50	
Big Springs, (D3)..... 98	Clothier, (C5)..... 830	Evans, (C3)..... 133	Haltown, (L2)..... 269	
Bim, (C5)..... 579	Clover Lick, (F4)..... 211	Everettville, (F1)..... 643	Hambleton, (G2)..... 394	
Birch River, (F4)..... 220	Coal City, (D5)..... 868	Exchange, (E3)..... 95	Hamlin, (B4)..... 850	
Blacksville, (F1)..... 261	Coal Fork, (D4)..... 853	Fairmont, (F2)..... 23,105	Hammond, (F2)..... 261	
Blaine, (H2)..... 190	Coalton, (G3)..... 417	Fairplain, (C3)..... 61	Handley, (D4)..... 949	
Blair, (C5)..... 202	Coalwood, (C6)..... 2,516	Fairview, (F1)..... 831	Hanging Rock, (J2)..... 83	
Blakeley, (D4)..... 388	Coco, (D4)..... 174	Falling Waters, (L1)..... 63		
Blaker Mills, (E5)..... 49		Falls Mill, (E3)..... 46		
Bloomery, (K2)..... 66		Farmington, (F1)..... 880		
Blue Creek, (D4)..... 300		Fayetteville, (D4)..... 1,347		
Bluefield, (D6)..... 20,641				

WEST VIRGINIA

Total Population 1,901,974

Knob Fork, (E1) ... 49	Millstone, (D3) ... 44	Pence Springs, (E5) ... 63	Saint George, (G2) ... 184	Turtle Creek, (C4) ... 187
La Frank, (F4) ... 110	Milton, (B4) ... 1,641	Pennsboro, (E2) ... 1,738	Saint Marys, (D2) ... 2,201	Uffington, (G1) ... 108
Lahmansville, (H2) ... 55	Minden, (D5) ... 1,858	Pentress, (F1) ... 100	Salem, (E2) ... 2,571	Ungers Store, (K2) ... 104
Lanark, (D5) ... 600	Mineralwells, (C2) ... 82	Petersburg, (H3) ... 1,751	Salt Rock, (B4) ... 138	Union, (E5) ... 346
Landisburg, (E5) ... 135	Mingo, (F3) ... 70	Peterstown, (E6) ... 467	Salt Sulphur Springs, (E5) ... 40	Uniontown, (E1) ... 231
Landville, (C5) ... 212	Moatsville, (G2) ... 89	Pietrouleum, (D2) ... 212	Sand Fork, (E3) ... 166	Uniontown, (E1) ... 231
Lantz, (F3) ... 62	Mohawk, (C5) ... 173	Philippi, (E2) ... 1,955	Sandstone, (E5) ... 241	Valley Bend, (F3) ... 93
Lavalatte, (B4) ... 110	Mole Hill, (E2) ... 163	Pickaway, (G5) ... 70	Saulsville, (C5) ... 69	Valley Grove, (K3) ... 1,196
Lawton, (E5) ... 890	Monaville, (B5) ... 1,022	Pickens, (F3) ... 313	Scarbro, (D5) ... 602	
Layland, (E5) ... 960	Monclo, (C5) ... 597	Piedmont, (H2) ... 2,677	Scott Depot, (C4) ... 146	
Lead Mine, (G2) ... 38	Monongah, (F2) ... 1,790	Pierce, (H2) ... 255	Secondcreek, (F5) ... 51	
Lenore, (B5) ... 209	Montcoal, (D5) ... 513	Pike, (D2) ... 76	Seebert, (F4) ... 48	
Leon, (C3) ... 219	Montgomery, (D4) ... 3,231	Pinch, (D4) ... 108	Selbyville, (F3) ... 164	
Leopold, (E2) ... 110	Montrose, (G2) ... 122	Pine Grove, (E1) ... 841	Seth, (C4) ... 1,253	
Lerona, (D6) ... 50	Moorefield, (J2) ... 129	Pineville, (C5) ... 769	Sewell, (E5) ... 482	
Le Roy, (C3) ... 68	Mooresville, (F1) ... 230	Pipestem, (E5) ... 50	Sharon, (D4) ... 741	
Lesage, (B3) ... 774	Morgansville, (E2) ... 55	Pliny, (C3) ... 52	Sharples, (C5) ... 708	
Leslie, (E4) ... 774	Morgantown, (E) ... 16,655	Plymouth, (C3) ... 300	Shaw, (H2) ... 621	
Lester, (D5) ... 909	Morrisville, (C4) ... 277	Poca, (C4) ... 621	Shenandoah Junction, (L2) ... 256	
Letart, (C3) ... 117	Moundsville, (E1) ... 14,168	Pleasant, (E3) ... 3,538	Sherrard, (K3) ... 945	
Levells, (J2) ... 47	Mount Alto, (C3) ... 70	Porterwood, (G2) ... 136	Shinnston, (F2) ... 2,817	
Lewisburg, (E5) ... 1,466	Mount Carbon, (D5) ... 489	Powellton, (D4) ... 1,461	Shirley, (E2) ... 183	
Lex, (C6) ... 189	Mount Clare, (F2) ... 277	Power, (K5) ... 964	Shoals, (B4) ... 63	
Liberty, (C3) ... 249	Mount Gay, (B5) ... 698	Powhatan, (D6) ... 397	Shock, (D3) ... 44	
Lindsie, (E6) ... 52	Mount Hope, (D5) ... 2,431	Pratt, (D4) ... 417	Shredsby, (D4) ... 285	
Linn, (E2) ... 40	Mount Storm, (H2) ... 200	Premier, (C6) ... 997	Silica, (F3) ... 136	
Little Birch, (E3) ... 46	Mud, (C4) ... 66	Price Hill, (D5) ... 608	Silverton, (C3) ... 52	
Little Otter, (E3) ... 283	Mullens, (D5) ... 3,026	Richard, (A4) ... 65	Simpson, (F2) ... 335	
Littleton, (F1) ... 539	Muraysville, (C2) ... 98	Princeton, (D6) ... 7,426	Sinks Grove, (F5) ... 289	
Livewood, (C3) ... 197	Myra, (B4) ... 146	Proctor, (E1) ... 143	Sissonville, (C3) ... 201	
Lizemores, (D4) ... 70	Nallen, (E4) ... 200	Prunty, (D2) ... 71	Sistersville, (D1) ... 2,702	
Loggelly, (D4) ... 671	Naugatuck, (B5) ... 146	Pughton, (K4) ... 565	Slab Fork, (D5) ... 1,069	
Logan, (B5) ... 5,166	Needmore, (J2) ... 40	Pullman, (D2) ... 204	Slagle, (C5) ... 512	
London, (D4) ... 688	Nellis, (C4) ... 806	Purysville, (J2) ... 58	Slanesville, (K2) ... 58	
Loukout, (E4) ... 638	Necola, (F5) ... 170	Putney, (D4) ... 803	State, (D2) ... 71	
Loom, (K2) ... 78	Nestorville, (G2) ... 92	Putney, (D4) ... 803	Sleepy Creek, (K1) ... 299	
Looneyville, (D3) ... 56	Newark, (D2) ... 80	Putney, (D4) ... 803	Smithburg, (E2) ... 287	
Lorado, (C3) ... 1,331	Newburg, (G2) ... 696	Putney, (D4) ... 803	Smithfield, (E2) ... 455	
Lorents, (F2) ... 100	New Creek, (J2) ... 44	Putney, (D4) ... 803	Smithville, (D2) ... 563	
Lost City, (J3) ... 100	New Cumberland, (K5) ... 2,098	Putney, (D4) ... 803	Smoke Hole, (H3) ... 41	
Lost Creek, (F2) ... 851	Newell, (K4) ... 1,809	Putney, (D4) ... 803	Sophia, (D5) ... 1,160	
Lost River, (J3) ... 102	New England, (C2) ... 102	Putney, (D4) ... 803	South Charleston, (C4) ... 10,377	
Lowell, (E5) ... 119	New Haven, (C3) ... 606	Putney, (D4) ... 803	Spangsbury, (D6) ... 58	
Lowgap, (C4) ... 250	New Martinsville, (E1) ... 3,491	Putney, (D4) ... 803	Spencer, (D3) ... 2,497	
Lumberport, (F2) ... 1,285	New Milton, (E2) ... 66	Putney, (D4) ... 803	Sprague, (D5) ... 1,256	
Lundale, (C5) ... 1,590	Newton, (D3) ... 190	Putney, (D4) ... 803	Sprig, (B5) ... 487	
Maben, (D5) ... 857	Nitro, (C4) ... 2,983	Putney, (D4) ... 803	Springs Creek, (F5) ... 57	
Mable, (C3) ... 250	Nolan, (B5) ... 182	Putney, (D4) ... 803	Springfield, (J2) ... 599	
Mabscott, (D5) ... 1,473	Normantown, (E3) ... 150	Putney, (D4) ... 803	Spruickville, (B4) ... 86	
McCorick, (C4) ... 170	North Fork, (D6) ... 387	Putney, (D4) ... 803	Star City, (F1) ... 1,175	
McDowell, (D6) ... 861	North Mountain, (K1) ... 76	Putney, (D4) ... 803	Stickney, (D5) ... 479	
Mace, (F4) ... 113	Norton, (G3) ... 539	Putney, (D4) ... 803	Stittner, (B4) ... 212	
Macfarlan, (D3) ... 89	Nutter Fork, (F2) ... 1,803	Putney, (D4) ... 803	Sutton, (C5) ... 902	
McVeachen, (K6) ... 3,726	Oak Hill, (D5) ... 3,213	Putney, (D4) ... 803	Sony Bottom, (F4) ... 56	
McWhorter, (F2) ... 73	Oakvale, (D6) ... 273	Putney, (D4) ... 803	Stotesbury, (D3) ... 1,190	
Madison, (C4) ... 1,205	Ocean, (C5) ... 112	Putney, (D4) ... 803	Strange Creek, (E3) ... 158	
Magnolia, (K1) ... 160	Odd, (D5) ... 61	Putney, (D4) ... 803	Stumptown, (E3) ... 46	
Magnolia, (G1) ... 212	Ohley, (D4) ... 175	Putney, (D4) ... 803	Sugar Grove, (H3) ... 59	
Malden, (C4) ... 375	Okeefe, (B5) ... 150	Putney, (D4) ... 803	Sullivan, (D5) ... 732	
Mallory, (C5) ... 717	Okonoko, (J1) ... 131	Putney, (D4) ... 803	Summersville, (E4) ... 643	
Mammoth, (D4) ... 882	Olcott, (C4) ... 655	Putney, (D4) ... 803	Summit Point, (K2) ... 268	
Man, (C5) ... 1,342	Omar, (C5) ... 1,239	Putney, (D4) ... 803	Wiley Ford, (J1) ... 765	
Manheim, (G2) ... 227	Oma, (K2) ... 121	Putney, (D4) ... 803	Wileyville, (E1) ... 197	
Mannington, (F1) ... 3,145	Ona, (B4) ... 87	Putney, (D4) ... 803	Wilkinson, (B5) ... 487	
Marfrance, (E4) ... 875	Orgas, (F1) ... 122	Putney, (D4) ... 803	Williamsburg, (F5) ... 177	
Marie, (E5) ... 57	Orlando, (E3) ... 140	Putney, (D4) ... 803	Williamson, (B5) ... 8,366	
Marlinton, (F4) ... 1,444	Osage, (F1) ... 864	Putney, (D4) ... 803	Williamstown, (C2) ... 1,687	
Marmet, (C4) ... 1,814	Osego, (D5) ... 680	Putney, (D4) ... 803	Wilson, (H2) ... 59	
Marting, (D4) ... 506	Oxford, (E2) ... 100	Putney, (D4) ... 803	Wilsonburg, (F2) ... 818	
Martinsburg, (K2) ... 15,063	Packville, (C5) ... 550	Putney, (D4) ... 803	Windsale, (B5) ... 45	
Mason, (B2) ... 795	Paden City, (D1) ... 2,215	Putney, (D4) ... 803	Winding Gulf, (D5) ... 650	
Masonstown, (G1) ... 869	Palestine, (D2) ... 331	Putney, (D4) ... 803	Windsor Heights, (K5) ... 46	
Masonville, (H3) ... 800	Panther, (C6) ... 323	Putney, (D4) ... 803	Winfield, (C2) ... 977	
Matewan, (B5) ... 905	Paradise, (C3) ... 40	Putney, (D4) ... 803	Winfield, (C3) ... 318	
Mathias, (J3) ... 100	Park, (F2) ... 666	Putney, (D4) ... 803	Winifrede, (C4) ... 111	
Matoka, (D6) ... 926	Parkersburg, (D2) ... 103	Putney, (D4) ... 803	Winona, (E4) ... 1,058	
Maud, (E1) ... 72	Parsons, (G2) ... 2,077	Putney, (D4) ... 803	Wolf Summit, (F2) ... 528	
Maybrey, (D6) ... 2,920	Pattersons Creek, (J1) ... 48	Putney, (D4) ... 803	Woodlands, (K6) ... 70	
Maysville, (H2) ... 136	Paw Paw, (K1) ... 990	Putney, (D4) ... 803	Woodruff, (L6) ... 79	
Meador, (B5) ... 287	Pax, (D5) ... 631	Putney, (D4) ... 803	Woodville, (C4) ... 44	
Meadow Bluff, (E5) ... 100	Peach Creek, (C5) ... 1,034	Putney, (D4) ... 803	Worthington, (F2) ... 507	
Meadow Bridge, (E5) ... 477	Peck Mill, (B5) ... 52	Putney, (D4) ... 803	Wymer, (C3) ... 68	
Meadowbrook, (F2) ... 440	Pemberton, (D5) ... 811	Putney, (D4) ... 803	Yawkey, (C4) ... 63	
Meadow Creek, (E5) ... 260		Putney, (D4) ... 803	Yolyn, (C5) ... 245	
Merrimac, (B5) ... 87		Putney, (D4) ... 803	Yukon, (C6) ... 266	
Metz, (F1) ... 150		Putney, (D4) ... 803	Zenith, (F5) ... 40	
Middlebourne, (E1) ... 733		Putney, (D4) ... 803		
Midkiff, (B4) ... 111		Putney, (D4) ... 803		
Mill Creek, (G3) ... 732		Putney, (D4) ... 803		
Mill Point, (F4) ... 80		Putney, (D4) ... 803		

● County seat.

hickory, walnut, cherry, poplar, sycamore, elm, and other hardwoods.

Small animals valuable for food or fur live in the woodlands. These include the raccoon, mink, skunk, opossum, gray and red fox, squirrel, and rabbit. White-tailed deer and black bear are plentiful in the highlands. Trout, muskellunge, bass, walleyed pike, carp, catfish, perch, bluegills, and suckers are found in the rivers and streams.

Conservation and Development. Protection of game and fish was begun in West Virginia as early as 1897, and protection of forests started in 1909. In 1933 the State Conservation Commission was created to bring together all conservation activities. The forestry division maintains a large staff of fire wardens, observers, and rangers. Word of a spreading forest fire may be sent quickly from seventy-five lookout towers over a network of state and Federal telephone lines. Radio stations also afford fire prevention communication. A 200-acre nursery at Lesage supplies forest tree seedlings at cost to landowners for use in replanting the forests. In 1940 a program was begun to help farmers conserve their wood lots and protect resources of soil and water through forest plantings.

Game refuges have been set aside in all the state-owned lands. Large numbers of deer, raccoon, beaver, rabbits, quail, and wild turkeys are raised and set free each year. The streams are restocked with game fish from the state-owned Marlinton and Petersburg trout hatcheries and the Palestine and Ridge bass hatcheries. The Federal Government maintains fish hatcheries at White Sulphur Springs and Leetown.

The state has taken measures to check the damage caused by soil erosion, with help from the Federal Government. The building of dams across several of the mountain streams supplies hydroelectric power and prevents floods. State and Federal programs help keep streams pure and encourage the processing of waste from industrial plants which otherwise would pollute the streams.

The People and Their Work

Population: 1,901,974 (1940), ranking twenty-fifth among the states. *Density,* 70 persons per square mile, ranking thirteenth. *Distribution,* urban, 28.1 per cent; rural, 71.9 per cent. *Largest cities,* Huntington (78,836), Charleston (67,914), Wheeling (61,099), Clarksburg (30,579), Parkersburg (30,103). For population of other cities, see back of colored map. *Chief artificial lakes,* Cheat, Shawnee, Silver, Tygart, and Washington.

Chief Products: *Mineral,* coal, natural gas, petroleum, natural gasoline, sand and gravel, limestone, sandstone, glass sand, salt brine, iron ore. *Manufactured,* iron and steel, nickel, refinery products, chemicals, tableware, glazing and structural glass, chinaware, pottery, lumber, textiles. *Agricultural,* cattle and calves, dairy products, sheep, chickens and eggs, corn, hay, buckwheat, fruits (especially apples and peaches), vegetables, tobacco.

The People. The West Virginia country was once the hunting ground of several tribes of Indians, chiefly the Algonquin, Iroquois, and Sioux, although none claimed the area as a permanent home. As the eastern coast became settled by white men, many of the coastal Indians entered the region, but most of them continued

into Kentucky and other territories. There are fewer than fifty Indians in West Virginia today.

The first white settlers in West Virginia, which was then the western part of Virginia, were Pennsylvania Germans, who were seeking new lands and greater religious freedom. The Scotch-Irish, who were always looking for new homes on the frontiers, came mainly from Pennsylvania, Maryland, New York, and Virginia. George Washington reported that there were many German settlers in the region as early as 1748, when he completed a survey of land for Lord Thomas Fairfax. Most of the pioneer farmers settled in the eastern Panhandle, in the upper Ohio Valley, and on the Greenbrier and New rivers.

Welsh and English immigrants came to take up land before the Revolutionary War. The building of the Baltimore and Ohio Railroad in the early 1850's brought Irish laborers, many of whom settled in the region.

As the state's huge mineral resources were developed, Italian, German, Polish, Hungarian, and Irish immigrants came in large numbers to work in the mining and manufacturing centers. The greatest number of immigrants came between 1910 and 1920.

Today, 97.7 per cent of the people are native-born. Of the foreign-born, who live chiefly in the industrial cities and the coal-mining towns, those most numerous are the Italians, Poles, Hungarians, Austrians, English, and Germans. Negroes, who work in the mines and factories, make up 6.2 per cent of the population.

Minerals. Great wealth is produced from the minerals of West Virginia, and many of the mineral deposits offer possibilities for future development.

Coal was discovered in western Virginia in 1742, and is now mined commercially in thirty-five of the fifty-five counties. It is by far the most valuable product of the state. It is shipped to many other states, and has also speeded up industrial growth in West Virginia, as it is a cheap and convenient fuel. Great beds of bituminous and semibituminous coal are found under 17,000 square miles, or about two thirds of the total area of West Virginia. It is figured that a hundred billion tons still remain to be mined. The Pocahontas variety, which gives off very little smoke when it burns, is famous for its superior heating and steam-producing qualities. Pocahontas coal, the cannel coal of the Kanawha Valley, and the Pittsburgh coal of the Fairmont field are used for making coke. The cannel coal is a rich source of such by-products as coal tar, pitch, creosote, and naphtha. McDowell County ranks highest among the counties in coal production. Many farmers have small coal mines for their own use.

Natural gas comes from holes or cracks in the earth and was discovered in the region in the 1700's. Natural gas is a cheap, easily used fuel. Most of the supply is used as fuel in manufacturing plants, not only in West Virginia's industrial cities, but also in Baltimore, Md., in Pittsburgh, Pa., and in Cleveland, Cincinnati, Akron, and Youngstown, Ohio. The gas fields cover most of the western half of the state.

Petroleum was known to the Indian hunters of the region, who skimmed it from the surface of pools and smeared it on their bodies to keep insects away. A German traveler who visited the region in 1781 reported

that Indians drank the oil as a medicine. Pioneer white settlers followed the Indians' example. For years, bottled rock oil, as it was called, was used as a medicine for many ailments. Petroleum was first considered a nuisance, since the oil (called "devil's grease") ruined the brine in the salt wells. The oil fields of West Virginia were developed rapidly after people realized the possibilities of using petroleum. An oil well was drilled at Burning Springs as early as 1859. For the next three years the stampede for "black gold" was almost as great as the rush to the California gold fields ten years before. The oil production was over 14,000,000 barrels in 1901, the best year, but it went down gradually as the richer pools were emptied. About 3,500,000 barrels are now produced each year.

Salt was produced in the 1700's from pools of brine found in western Virginia, and the salt springs attracted many settlers to the region. Today, the salt brine is used chiefly in making soda ash, caustic soda, chlorine, and other chemical compounds. In 1943, industrialists began to develop a huge bed of pure rock salt, discovered in the northern Panhandle. This deposit is about 2,400 square miles in area and about 110 feet thick. It lies a mile below the surface of the earth, and the salt is taken by forcing boiling water into the bed and pumping out the brine in which the salt has dissolved. During World War II, there was a great need for chemical compounds, and many factories were set up to use the salt in manufacturing synthetic materials and fibers. Many other large chemical industries have grown up around the salt deposits of the Kanawha Valley.

Sand, Gravel, and Clay. A fine grade of sand which is found in the valleys of the Ohio and Kanawha rivers is used for the manufacture of glass. The top of a mountain has been removed near Berkeley Springs, in Morgan County, in order to reach a deposit of glass sand that is 98 per cent pure silica. Glass is made at Charleston, Huntington, Fairmont, Clarksburg, and St. Marys. Billions of glass marbles are manufactured at Clarksburg and St. Marys. Moundsville turns out world-famous table glassware, and plants at Morgantown make 30,000 varieties of glass objects. Hand-blown glass from Milton was used in restoring the Cathedral of Rheims, France, and in the National Cathedral, Washington, D.C., and the Cathedral of St. John the Divine, New York City. Molding sands are used in making castings in the great iron and steel mills. They are scooped up from the flood plains of the Ohio and Big Sandy rivers. Huge beds of sand and gravel suitable for building construction and road making are found throughout the state. Native clays have been used in West Virginia potteries since about 1785. They are used for the manufacture of fire-brick, paving brick, tile, pottery, porcelain, and chinaware. Especially fine grades of potters' clay and fire clay are found in the northern Panhandle and in the valley of the Ohio.

Other Minerals. Valuable commercial limestone is found in many parts of the state, especially throughout the Allegheny Highlands. It is used for making agricultural lime, cement, and insulation materials. Jefferson and Berkeley counties produce limestone, and also a stone known as dolomite, which is used in building highways and railway roadbeds. Other important min-

eral products include marble, which is quarried in Pocahontas County, and manganese, which is mined in Greenbrier and Monroe counties.

Manufactures. Abundant raw materials, cheap fuel, and nearness to great centers of population have encouraged the growth of manufacturing in West Virginia. One of the first industries to develop in the region was the smelting of iron from native ore. Iron was produced in Hardy and Pendleton counties during the Revolutionary War. The cannon balls Commodore Perry used in the Battle of Lake Erie, during the War of 1812, were cast in a furnace in Hancock County. About 1810 the first steel plant was built at Wheeling, beginning that city's rapid industrial growth.

Native ore was not used in the furnaces after 1880, since it was more profitable to bring in higher-grade ore from the newly developed mines of Minnesota and Michigan. Today, ore is shipped by freighter from the Great Lakes region to Lake Erie ports, then by rail to West Virginia. Wheeling and Weirton are the chief centers of the steel industry, and huge furnaces and mills line the banks of the Ohio River for miles. One of the largest nail factories in the world is at Wheeling. Weirton manufactures galvanized sheet steel and railroad spikes. Iron and steel products are made at several other cities, and South Charleston has a huge armor-plate factory.

Charleston has one of the largest ax plants in the world. Clarksburg has a great tin-plate factory. Dunbar has the largest enamelware plant in the country, and Parkersburg has the biggest shovel plant. There are large railroad-car and foundry works at Huntington.

The resources of the Kanawha Valley are used in the manufacture of chemical compounds. Such varied materials as synthetic rubber, plastics, dyes, and synthetic fibers are made in the factories of Charleston, Huntington, and Belle. Chemicals made in the Kanawha Valley are also shipped to factories at Clarksburg, Parkersburg, and Wheeling.

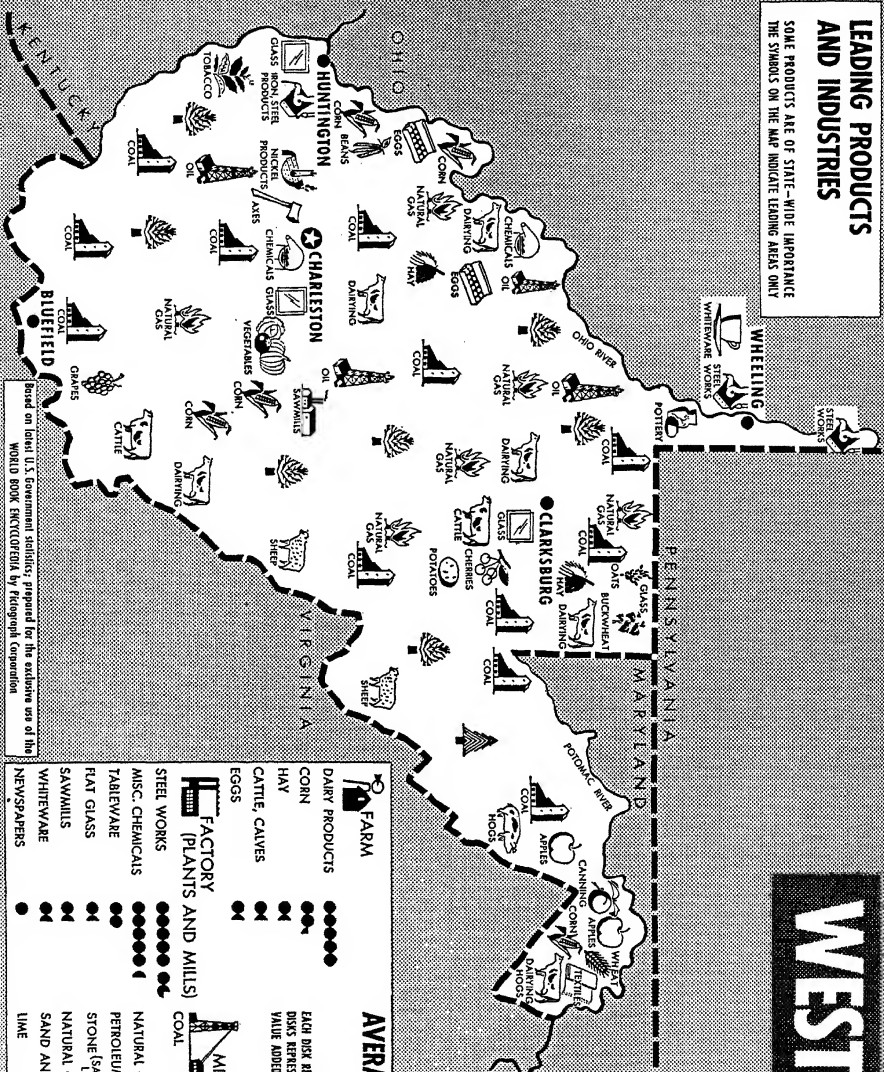
The manufacture of textiles is an important industry, with hosiery mills located at Martinsburg and Berkeley Springs, and factories making work clothes and tents at Huntington, Wheeling, and Morgantown. Rayon yarn is made at Nitro and Parkersburg. Raw nylon is made at Belle, and spun in plants in New Jersey.

Agriculture. In spite of West Virginia's rough surface and thick forests, agriculture is a flourishing occupation in the state. Corn has been the most important crop since pioneer days, and is grown in every county, with the greatest production along the Ohio River and in the Potomac Basin. Other crops raised in the valley lands include oats, rye, barley, soybeans, broomcorn, popcorn, potatoes, wheat, and sorghum. Hay is widely grown, with Roane, Jackson, Preston, and Harrison counties leading in acreage. Buckwheat is raised on the mountain farms. Large yields of tobacco are produced on the hillsides of the lower Ohio Valley.

Livestock and Dairying. Five million acres of bluegrass in West Virginia offer excellent pasture land for livestock. Prize beef cattle are raised in the valleys of the Monongahela, Kanawha, South Branch (Potomac), and Greenbrier rivers. The mild winters make it possible for the stock to graze for nine months of the year. Dairy

LEADING PRODUCTS AND INDUSTRIES

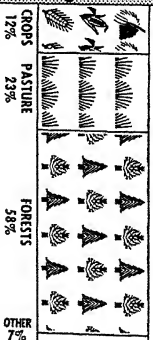
SOME PRODUCTS ARE OF STATE-WIDE IMPORTANCE
THE SYMBOLS ON THE MAP INDICATE LEADING AREAS ONLY



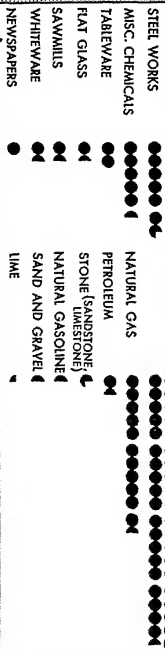
Based on latest U.S. Government statistics, prepared for the exclusive use of the
WORLD BOOK ENCYCLOPEDIA by Philipograph Corporation

WEST VIRGINIA

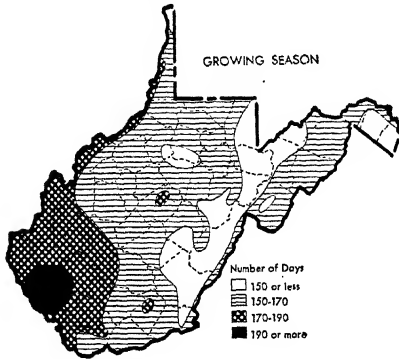
LAND USE



AVERAGE YEARLY VALUE OF LEADING PRODUCTS



farms are found in many sections, and Harrison, Mason, Wood, Kanawha, Preston, Greenbrier, and Marshall counties lead in dairy production. There are many herds of purebred cattle, including the Hereford and Angus strains. The industrial cities provide ready markets for dairy products and also for chickens and eggs. Poultry is



raised on nearly every farm, but especially in the counties along the Ohio River, and in Hampshire and Hardy counties to the northeast. Hogs are raised in every county, and sheep are pastured in all the cattle-growing sections.

Fruits and Vegetables. The eastern tip of West Virginia lies in the Shenandoah Valley. This is one of the best apple-growing sections in the United States. The section has rich soil and abundant rainfall, and the many orchards are protected from frost by high ridges. The northern Panhandle is also important for fruitgrowing. Grimes Golden and the Golden Delicious apples were first grown in West Virginia. The fruitgrowers of West Virginia, Virginia, Maryland, and Pennsylvania maintain an apple-marketing organization at Martinsburg. In this city there are large apple-processing plants which produce canned fruit, vinegar, and cider. Peaches are widely grown in Hampshire, Hardy, Berkeley, Mineral, and Morgan counties.

Other fruit crops grown widely in the chief apple-producing areas include cherries, grapes, pears, plums, and quinces. Raspberries and blackberries are harvested in all the counties. Watermelons, tomatoes, potatoes, and cabbage are shipped outside the state.

Forests and Forest Products. The production of lumber and wood products is a leading industry. Lumber production reached its peak in 1909, when nearly one and a half billion board feet were sawed. Production is now about 500,000,000 feet a year. Few states produce as much fine wood for furniture making as West Virginia. These woods include oak, cherry, walnut, spruce, and poplar. Logs are shipped for paper and wood pulp, and several woods are used to manufacture a variety of finished products, including shingles, laths, and boxes. Mine timbers are an important product. Wooden heels for women's shoes are manufactured at Rainelle. Williamson makes hardwood mop and broom handles. One of the largest clothespin factories in the world is at Richwood.

Transportation. West Virginia has about six hundred

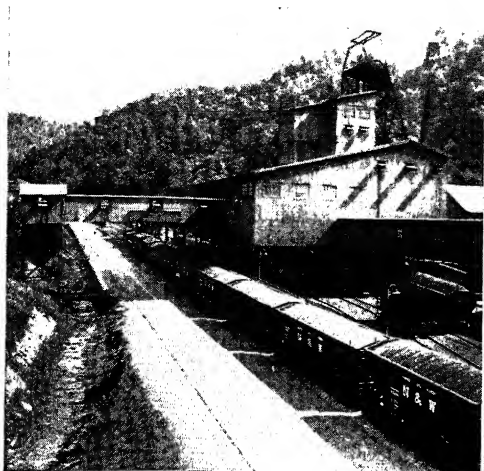
miles of navigable waterways, which carry an immense tonnage of steel, steel products, coal, oil, chemicals, lumber, and other industrial products. Since 1873 a system of locks and dams has made transportation possible on several of the rivers within the state. These include the Monongahela, Kanawha, Little Kanawha, and Big Sandy. One of the largest amounts of waterborne freight tonnage in the world is carried on the Monongahela from West Virginia to the Pittsburgh industrial area. The river channels were improved for barge traffic in 1930, when the Federal Government built eighty-one locks and dams on the Ohio River and its West Virginia branches.

Great skill has been needed in railroad building, because of the rugged surface of the land. The first railroad in the state was the Baltimore and Ohio, which entered the state at Harpers Ferry in 1838. It was extended to Wheeling, by way of Cumberland, Md., in 1852. The builders were forced to construct eleven tunnels and 113 bridges between Cumberland and Wheeling. Today, West Virginia has more than 7,000 miles of railroads.

It is said that West Virginia has had a greater variety of road-building problems than any state east of the Rockies, because of its many mountains and streams. George Washington was the first to urge that roads be built. He pointed out to the Virginia Assembly that the mountains would divide the interests of the people unless transportation was made easier. Few roads were built in early days, and the proof of Washington's wisdom came when West Virginia separated from Virginia because the easterners and westerners did not agree on the slavery question. Three historic highways were built across West Virginia during the early 1800's. These were the Kanawha and James River Turnpike, now Federal Route 60 and known as the Midland Trail, built before 1800; the Cumberland Road, now Federal Route 40, which crossed the state in 1818; and the Northwestern Turnpike, now Federal Route 50, built in 1838. Road building on a large scale did not begin until after the State Road Bureau was created in 1913. The present highway system includes more than 4,700 miles of hard-surfaced roads.

Press and Radio. The first newspaper published in West Virginia was the *Potomac Guardian and Berkeley Advertiser*, which was established at Shepherdstown in 1790. Most of the pioneer newspapers were one-man productions. The editor-printer usually rode horseback to the homes of his subscribers to distribute the papers from his saddlebags. Among the early periodicals were the *Farmers' Repository*, founded in 1808 at Charles Town, the first agricultural journal in West Virginia; the *Christian Baptist*, established in 1823 at Bethany, the first religious paper; and the *Ladies' Garland*, begun in 1824 at Harpers Ferry, the first paper published chiefly for women.

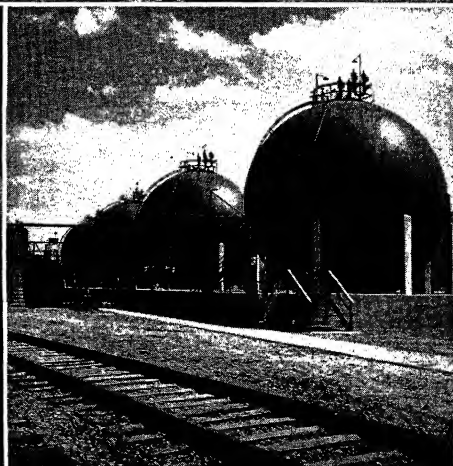
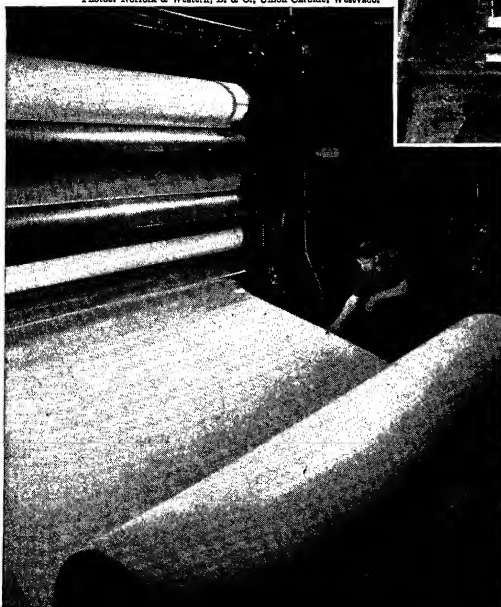
Today, nearly 150 newspapers, more than thirty of which are dailies, and about twenty-six periodicals are published in West Virginia. Two early weekly newspapers are still published. These are the *Spirit of Jefferson* (1844), at Charles Town, and the *Herald* (1846), at Wellsburg. The *Wheeling Intelligencer* (1852) is the only daily established in the state before 1860 which is still being published. Other leading newspapers include



MINE AND FACTORY SCENES

Above: At the tipple of a bituminous mine in West Virginia, the "World's Coal Bin," coal is loaded into waiting freight cars. *Above right:* Two locomotives, one pushing and one pulling, sometimes are needed to haul the long, heavily loaded coal trains up the steep grades of the Allegheny Mountains. *Right:* This huge chemical plant, located on Blaine Island in the Kanawha River, is one of many that have made the beautiful Kanawha Valley, once the haunt of Daniel Boone, the center of the chemical-manufacturing industry in the United States. *Below:* West Virginia's great softwood forests supply the pulp that is made into paper in this paper mill. *Below right:* Synthetic rubber plant at Institute, where alcohol, made from grain, and benzene, derived from coal, are transformed by the magic power of chemistry into rubber.

Photos: Norfolk & Western; B. & O.; Union Carbide; Westvaco.



the *Charleston Gazette and Mail*, the *Wheeling News-Register*, the *Huntington Advertiser* and *Herald-Dispatch*, and the *Bluefield Telegraph*.

The first radio station in the state was WWVA, founded in 1926 at Wheeling. Today, there are twenty-one commercial radio stations in the state, including WCHS and WGKV at Charleston, and WMMN at Fairmont.

Social and Cultural Achievements

Educational Institutions: *State Teachers' Colleges*, at Athens (established, 1872), Fairmont (1867), Glenville (1872), Huntington (1837), Shepherdstown (1872), West Liberty (1898); (for Negroes) at Bluefield (1895) and Institute (1891). The West Liberty College maintains a center in Wheeling. *Other Colleges and Universities*, Alderson-Broaddus, Bethany, Davis and Elkins, Morris Harvey, Salem, Storer (Negro), and West Virginia Wesleyan colleges; Mason College of Music and Fine Arts; West Virginia Institute of Technology; West Virginia University.

State Welfare, Correctional, and Penal Institutions: *Children*, Children's Home, at Elkins; Training School (for feeble-minded boys), at Saint Marys; Industrial School for Boys, at Pruntytown; Industrial School for Colored Boys, at Lakin; Industrial Home for Girls, at Industrial; Industrial Home for Colored Girls, at Huntington; Colored Children's Home, at Huntington. *Physically handicapped*, tuberculosis sanitariums at Denmar (Negro), Hopemont, and Beckley. Berkeley Springs Sanitarium; Fairmont Emergency Hospital; Welch Emergency Hospital; McKendree Emergency Hospital, now used for aged and infirm Negroes; Schools for the Deaf and Blind, at Romney; Schools for the Colored Deaf and Blind, at Institute. *Mentally handicapped*, hospitals at Barboursville, Huntington, Lakin (Negroes), Spencer, and Weston. *Prisons*, Medium Security Prison, at Huttonsville; State Penitentiary at Moundsville.

Education. In early days, education in what is now West Virginia was carried on in homes and in log cabins. Many of these buildings also served as churches. The parents of the pupils paid the teacher in cash, farm products, or "bed and board." One of the first such schools in the region may have been at Old Fields in Hardy County, because in 1847, George Washington mentioned the "School House Old Field." Public-supported education began in 1796, when the Virginia Assembly voted state funds to provide three years of instruction for each child. Education beyond the three-year period was paid for by the parents. In 1810, at the suggestion of Thomas Jefferson, a "Literary Fund" was set up. This fund was to take effect in 1817, and to come from the money received from the sale of lands on which taxes had not been paid. This fund was intended to pay for the schooling of children whose parents were unable to pay. Many persons regarded this as a "pauper system," however, and the schools were not always successful. The Virginia Assembly permitted county school systems to be established in 1846. Under this law, about sixty academies were established and operated until the War between the States.

Separate free school systems were set up for white and Negro children when West Virginia became a state. The state superintendent of schools was made an elected officer. The state constitution adopted in 1872 provided enough taxation to support the schools. The standards of rural schools were improved by a grading system be-

gun by Alexander L. Wade, who was superintendent of schools in Monongalia County from 1875 to 1879. By 1900 there were twenty-four free high schools, and the number grew rapidly after state aid was granted to high schools in 1911.

The present-day school system is supervised by the State Board of Education, which was created in 1919, and by the Negro Board of Education, formed in 1933. Education is required for all children between the ages of seven and sixteen. County boards of education must furnish textbooks when parents are unable to do so. State aid is given to schools which need it to carry on a nine-month term.

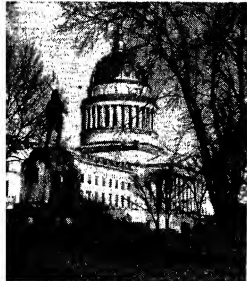
Accredited colleges and universities of West Virginia are discussed under their own names in *THE WORLD BOOK ENCYCLOPEDIA*. For a list of these schools, see the *Related Subjects* at the end of this article.

Libraries. Subscription libraries were established as early as 1813 at Wheeling and in Monongalia County. There were nine such libraries in the region by 1860. The State Library, founded in 1866, was the first library to be supported by public funds. A public community library was opened at Wheeling in 1883, but it was not until after 1900 that public libraries became more common in West Virginia. The State Library Commission was formed in 1929. Today, there are about fifty public library systems in the state, in addition to school and college libraries.

Arts and Crafts. Several handicrafts have been handed down from generation to generation among the mountain people of West Virginia. These include the making of furniture, woven coverlets and quilts, baskets, and pottery. The State Department of Education holds classes in weaving, pottery making, needlecraft, and wood carving. Interest in arts and crafts was long encouraged by exhibitions held by the Old White Art School and Colony, at White Sulphur Springs, the Art Club of Wheeling, and Marshall College Museum, at Huntington.

West Virginia first became known in literature through journals and sketches written by travelers from the East. One of the most famous of these reports was George Washington's account of his surveying trip through the mountains, which he wrote in 1748. The first book to be published in the region was *The Christian Panoply*, written by Richard Watson, Bishop of Llandoff, in 1797. Among well-known West Virginia writers are Margaret Prescott Montague, author of *Uncle Sam of Freedom Ridge* and many other stories about the mountain folk; Fanny Kemble Johnson, who wrote *The Beloved Son* and many short stories; Melville Davisson Post, author of *The Strange Schemes of Randolph Mason*; and Charles Frederick Tucker Brooke, author of scholarly works about William Shakespeare and Christopher Marlowe. Pearl Buck, author of *The Good Earth*, was born at Hillsboro. Stella Morgan, of Fairmont, wrote the popular novel, *Again the River*. Pare Lorentz, who was a native of the state, produced unusual motion pictures to help the conservation programs of the Federal Government. These films included *The River*, which was later published in book form, and *The Plow That Broke the Plains*.

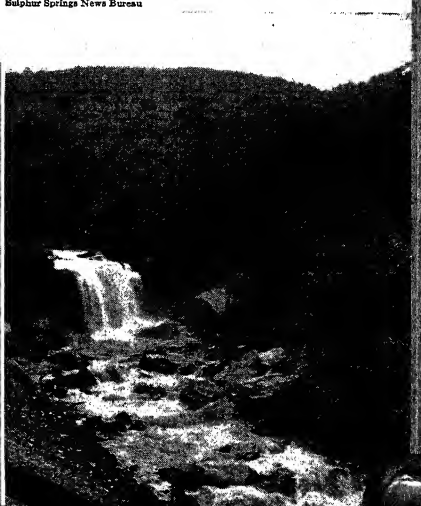
The coming of the steamboats in the early 1800's brought traveling theatrical companies that toured the



SCENIC WEST VIRGINIA

The tree-bordered bends of the Elk River, *above*, and tumbling Monongahela Falls, *lower right*, lend charm to beautiful Monongahela National Forest. *First left:* The State Capitol at Charleston, an imposing structure in Italian Renaissance style. The statue in the left foreground is that of a Union soldier. *Second left:* Jackson Mill, on the farm where "Stonewall" Jackson—famed Confederate leader—spent his boyhood, now is used as the state headquarters for training members of 4-H clubs. *Below left:* The Greenbrier Hotel, nestled in the shadow of lovely Greenbrier Mountain, is the center of activities at century-old White Sulphur Springs, one of the most famous watering places in the South.

Photos: U. S. Forest Service; Sawdars; W. Va. Publicity Com.; White Sulphur Springs News Bureau



river towns. By 1860 there were theaters in Wheeling and Charleston. Picturesque showboats anchored at landings along the Ohio, Monongahela, and Kanawha rivers. They presented such melodramas as *Uncle Tom's Cabin* and *East Lynne*. The Kanawha Players of Charleston, an amateur theater group, was formed in 1922.

Religion. German Quakers had established a congregation at New Mecklenburg (now Shepherdstown) as early as 1738, and the Presbyterians even earlier. The earliest church building in the region was the Protestant Episcopal Mill Creek Church, which was built at Bunker Hill in 1740. Moravian missionaries first came to western Virginia in 1749, and founded several congregations. During the thirty years before the Revolutionary War, migrations from the East brought Quakers and Episcopalians. Churches were built by Presbyterians, Baptists, Methodists, German Lutherans, and Dunkards. By 1805 the Methodists had organized nine circuits in western Virginia, visited by circuit riders (ministers traveling on horseback). A Catholic church was built at Wheeling as early as 1822. Alexander Campbell, founder of the Disciples of Christ Church, lived and worked in West Virginia.

The principal faiths in West Virginia today are the Methodist; Baptist, Roman Catholic, Presbyterian, United Brethren, Protestant Episcopal, and Disciples of Christ.

Social Welfare. The first state-wide welfare services were begun to improve conditions in the mining industry. As early as 1889 the State Department of Labor was created to enforce labor laws. In 1883 the legislature set up the office of state mining inspector. Through the years that followed, the legislature increased the powers and duties of this office, until it became the Department of Mines in 1905. The Department of Mines is responsible for the inspection of mines, the enforcement of regulations and safety recommendations, the maintenance of mine rescue stations, and the training of rescue crews.

The State Board of Health was created in 1881. Its chief responsibility was the granting of licenses to physicians. The present-day public health program is administered by the State Health Department, which was created in 1917. It inspects sanitary conditions in schools, factories, hotels, and restaurants; supervises county health departments; and works to prevent epidemics of communicable diseases. The Sanitation Act of 1939 gave the department wide powers to regulate sewage disposal and to keep the streams pure. The Department of Public Assistance, created in 1936, operates several infirmaries and clinics for crippled children. It also administers financial and medical service to the needy. Since 1939 the Department of Public Assistance has maintained a traveling unit for the treatment of trachoma, a serious eye disease.

Progressive social laws include measures which prohibit the employment of children in dangerous occupations and provide old-age pensions, unemployment compensation, and safeguards for women workers in industry. A Workmen's Compensation Law was adopted in 1913.

Recreation and Outdoors

West Virginia's cool summers, numerous mineral and

medicinal springs, and beautiful scenery have made the mountain regions popular as health and pleasure resorts. There are miles of trails and bridle paths. Hunting and fishing are among the favorite sports. West Virginia's great variety of native plants and flowers have given it the name of "Botanist's Paradise."

State Parks and National Forests. Nearly two million acres have been set aside in national forests, state forests, and state parks. The national forests include Monongahela (about 900,000 acres), in nine central counties, and George Washington (97,805 acres), in two eastern counties and twelve Virginia counties. Among the state parks are:

Audra (316 acres), in Barbour County. A wooded tract of land along a boulder-strewn stream. Created, 1944.

Babcock (3,231 acres), in Fayette County. A deep gorge forms a picturesque setting for the park. Created, 1937.

Blackwater Falls (446 acres), near Davis. Sparkling water tumbles 63 feet over a rocky ledge in Blackwater Canyon. Created, 1934.

Cacapon (5,725 acres), in Morgan County. Prospect Rock gives a broad picture of rugged mountain country. A six-acre lake provides swimming, boating, and fishing. Trails wind through rolling woodland. Created, 1934.

Carnifax Ferry Battlefield (275 acres), in Nicholas County. A battlefield of the War between the States. Created, 1935.

Cathedral (118 acres), near Aurora in Preston County. A tract of virgin timber like that which once covered most of West Virginia. Created, 1942.

Droop Mountain Battlefield (265 acres), in Pocahontas County. Scene of one of the greatest battles of the War between the States. Here Confederate forces under the command of General Echols were defeated by Federal troops led by General Averell, on November 6, 1863. Beautiful woodland. Created, 1929.

Grandview (52 acres), near Beckley in Raleigh County. A scenic spot overlooking New River Gorge. Created, 1939.

Hawks Nest (48 acres), in Fayette County. A magnificent view of New River Gorge, 585 feet deep. Created, 1935.

Holly River (7,320 acres), in Webster County. Trails lead through woodland, gay in springtime with rhododendron and wild flowers. Trout fishing. Created, 1938.

Lost River (3,841 acres), in Hardy County. Two lookout points offer thrilling views of wooded mountains. In the park are Lee-Sulphur Springs and the Lee Cabin, built by the father of Robert E. Lee. Created, 1936.

Pinnacle Rock (32 acres), near Bluefield. An unusual stone formation on top of Flat Top Mountain. Several counties can be seen from the cliffs. Created, 1938.

Tomlinson Run (1,351 acres), in Hancock County. A dam project covers nearly thirty acres. Created, 1936.

Tygart Lake (1,775 acres), near Grafton in Barbour and Taylor counties. A Federal reservoir creates the largest lake in West Virginia (five and one-half square miles). Created, 1945.

Watoga (10,048 acres), on Greenbrier River in Pocahontas County. Largest state park, containing black bears, beavers, and deer. Created, 1934.

Other Interesting Places to Visit in West Virginia include:

Berkeley Springs, famous health resort, also named Bath after the famous watering place in England. The warm springs were peaceful territory for several tribes of Indians, many of them bitter enemies, who bathed together in the waters. George Washington noticed the health-giving qualities of the springs while he was surveying the land for Lord Fairfax, and often brought

his family here. In 1756, Fairfax granted the site of the town to the colony of Virginia, but provided that the springs were "to be forever free to the publick for the welfare of suffering humanity." Sick soldiers were treated here during the Revolutionary War. The *Old Hot Bath House*, which contains ten sunken Roman baths and is said to be nearly a hundred years old, is of interest to visitors. Other interesting features of Berkeley Springs include the *Washington Elm*, which is said to have been planted by George Washington, and the *Fairfax Bathtub*, a rock-lined hollow in the ground where Lord Fairfax took the waters apart from the other health seekers.

Blennerhassett Island, near Parkersburg in the Ohio River. Location of the magnificent mansion built about 1800 by Harman Blennerhassett, who was involved in Aaron Burr's plot to set up a government in the Southwest. See **BLANNERHASSETT, HARMAN**.

Charles Town, founded by Charles Washington, younger brother of George, in 1786. *Jefferson County Courthouse*, where John Brown was found guilty of murder and treason after his raid on Harpers Ferry. *Site of the John Brown Gallows*, marked by three stones said to have been taken from Brown's cell in the town jail. Near by are several historic homes, including three which members of the Washington family occupied. *Harewood* (built about 1770) was designed by George Washington for his brother, Samuel; Dolly Payne Todd and James Madison were married here in 1794, and Prince Louis Philippe and his brothers were guests at the time they were driven out of France. *Mordington*, or "Happy Retreat," the home of Charles Washington, was built about 1774. *Claymont Court* was built in 1820 by Bushrod Washington, grandnephew of the first President.

Harpers Ferry, site where John Brown and his raiders made their last stand against United States troops after they had seized the Federal arsenal in 1859.

Ice Mountain, in Hampshire County, on North River. At the foot of this natural wonder, ice can be dug or scooped from among the rocks even on the hottest summer days. Scientists say this natural "refrigeration" is caused by cold air currents that lie in open passages under the ground.

Jackson's Mill, near Clarksburg, the family farm where Thomas Jonathan ("Stonewall") Jackson spent his boyhood. A gristmill built in the 1830's still stands.

Moundsville. *Grave Creek Mound*, one of the largest Indian burial mounds in the United States, is in the heart of the city. Home of famous glassware.

Old Stone Church, at Lewisburg. Built of limestone blocks in 1796. Contains original pews, slave gallery, and pulpit with sounding board.

Spruce Knob, in Pendleton County, is the highest point in the state. Called "the birthplace of rivers" because mountain streams descend in nearly every direction.

Tu-Endie-Wei Park, in Point Pleasant, site of historic Battle of Point Pleasant in 1774, when troops led by Andrew Lewis defeated an army of Shawnee and Mingo Indians. The name of the park is an Indian word meaning "point between two waters" (the Ohio and Kanawha rivers).

Government

National: Electoral votes, 8. Representatives in Congress, 6.

State: Senators, 30; representatives (delegates), 94. *Capital*, Wheeling, 1863 to 1870; Charleston, 1870 to 1875; Wheeling, 1875 to 1885; Charleston, since 1885.

Counties: 55.

West Virginia is governed under its second constitution, adopted in 1872 and greatly amended in 1879. The first constitution was adopted when West Virginia became a state in 1863.

Constitutional conventions for revising and amending the present constitution may be called with the approval of a majority in each house of the legislature and the consent of a majority of the voters. Amendments become law when they are approved by two thirds of the members of each house and by a majority of the people.

Executive officers include the governor, secretary of state, treasurer, auditor, attorney general, superintendent of schools, and commissioner of agriculture. These officers are each elected for four years. The governor may not serve two terms in succession.

Legislative power is vested in a senate and a house of delegates. Senators are elected for four years, and delegates are elected for two years. Two senators are elected from each of the sixteen senatorial districts. Each county has at least one delegate, and the number ranges from one to eight, according to population. The legislature meets in January of odd-numbered years. Regular sessions are limited to sixty days, but may be extended beyond this period in an emergency.

Judicial decisions are made by a department headed by the Supreme Court of Appeals, made up of five judges elected for twelve years. The state is divided into twenty-four judicial districts. Each district has a circuit court headed by a judge elected for eight years. There are also intermediate and criminal courts in eight counties, city courts, including juvenile courts, and justices of the peace.

Local Government varies in the towns and cities. It includes the mayor-council, commission, and city-manager forms. County government is administered by county commissioners, usually three in number, who are elected for six years.

National Politics. Since 1872 West Virginia has divided its vote about equally between Republicans and Democrats in national elections. Before 1896 the state always voted Democratic. The Republicans won from 1896 to 1928, except in 1912, when the Bull Moose movement led by Theodore Roosevelt won the state vote. In 1932, 1936, 1940, and 1944, the state voted for Franklin D. Roosevelt. See **POLITICAL PARTY** (chart).

West Virginia has supplied several well-known leaders in national politics. These include William L. Wilson, Postmaster General from 1895 to 1897; Newton D. Baker, Secretary of War from 1916 to 1921; John Barton Payne, Secretary of the Interior from 1920 to 1921; Howard Mason Gore, Secretary of Agriculture from 1924 to 1925; John William Davis, Solicitor General from 1913 to 1918, ambassador to Great Britain from 1918 to 1921, and Democratic candidate for President in 1924; and Dwight Whitney Morrow, United States Ambassador to Mexico from 1927 to 1930.

Famous Men and Women

Several well-known persons, native to West Virginia or doing their most important work there, are given separate biographies (see *Biographies in the list of Related Subjects* at the end of this article). Others who have won state, national, or international fame include:

Chadwick, French Ensor (1844-1919), born at Morgantown. Union naval officer during the War between the States. In 1879 he investigated foreign navies and brought back information which was useful in building the new United States Navy. He served in the Spanish-

American War, and was President of the Naval War College from 1900 to 1903. Author of *Causes of the Civil War and Relations of the United States and Spain*.

Hines, John L. (1868-), born at White Sulphur Springs. Army officer in the Spanish-American War and World War I. Chief of Staff of the United States Army from 1924 to 1926.

Hughes, Edwin Holt (1866-), born at Moundsville. Became a Methodist minister in 1892 and bishop in 1908. He was a leader in bringing about the union of the three main branches of the Methodist faith in 1939, when he served as chairman of the Joint Committee on Union of American Methodist Churches.

Owens, Michael Joseph (1859-1923), born in Mason County. The son of a West Virginia coal miner, he became a master glass blower and was granted more than forty patents for inventions which changed the glass-making industry. Among his inventions are automatic machines for manufacturing bottles, tumblers, and sheet glass. He was head of several large glass companies in the United States and England.

Rumsey, James (1743-1792), born in Maryland. Inventor of a steamboat, which he demonstrated on the Potomac River near Shepherdstown in 1787.

White, Israel Charles (1848-1927), born in Monongalia County. Distinguished geologist who specialized in the study of coal, petroleum, and natural gas. In 1882 he won world fame for his work on gas and oil deposits. His work led to the opening of many oil-producing fields in West Virginia. He served as state geologist from 1897 to 1927. His geological record of West Virginia is said to be more complete than any other record covering a similar area in the world.

State Symbols and Events

State Seal. Leading industries of West Virginia are represented in the figures of a farmer and a miner. The other side of the seal shows a landscape and activities of the state at the time of its founding.

State Flag. The coat of arms of the state on a field of pure white. On the coat of arms is a rock covered with ivy on which is printed "June 20, 1863," the date the state was admitted to the Union. To the left, the figure of a farmer holds an ax and leans on a plow handle. To the right, the figure of a miner has a pickax over his shoulder and lumps of minerals at his feet. An anvil and sledge hammer are to the left of the miner. Two crossed rifles and a liberty cap are in the foreground. A sprig of rhododendron encircles the seal. Above the coat of arms is a brown ribbon which is lettered, "State of West Virginia." The field of white is bordered by a strip of blue on four sides. See FLAG (color plate, Flags of the States).

State Motto. *Montani Semper Liberi* (Mountaineers Are Always Freemen).

State Bird. Tufted titmouse. See BIRD (color plates, State Birds).

State Flower. Rhododendron. See FLOWER (color plate, Common Garden Flowers).

State Tree. None.

State Song. Unofficial, but popular, is "West Virginia Hills," words by Ellen King, music by H. E. Engle.

Annual State Events. Among the interesting events on the state calendar are:

Music Festivals, Wheeling, in April (no fixed date), Charleston, in May.

Strawberry Festival, Buckannon, in June.

West Virginia Day, state-wide, June 20.

Rhododendron Festival, Webster Springs, in July.

State Dairy Cattle Show, Jackson's Mill, in August.

Buckwheat Festival, Kingwood, in August.

West Virginia State Fair, Lewisburg, in August.

Tomato Festival, Berkeley Springs, in September.

Mountain State Forest Festival, Elkins, in October.

Tobacco Festival, Huntington, mid-November.

Apple Harvest Festival, Martinsburg, in November.

History

1670 John Lederer reached the top of the Blue Ridge Mountains, overlooking western Virginia.

1726 First settler, Morgan ap Morgan, came to Bunker Hill, Berkeley County.

1727 Germans from Pennsylvania founded first settlement at New Mecklenburg (now Shepherdstown).

1742 Coal discovered on Coal River.

1747-1748 George Washington surveyed land in western Virginia for Lord Thomas Fairfax.

1762 Romney and Shepherdstown, oldest towns, established by the Virginia Assembly.

1772 George Rogers Clark explored the Ohio and Kanawha river valleys.

1773 Petitions sent to England to ask that a new colony be formed in western Virginia.

1815 James Wilson, digging for salt, discovered gas well instead.

1838 First railroad entered the state at Harpers Ferry.

1859 John Brown raided Harpers Ferry.

1861 Western Virginia counties opposed secession from the Union and organized a separate government.

1863 West Virginia admitted to the Union as the thirty-fifth state.

1885 Capital established permanently at Charleston.

1932 New state Capitol dedicated.

1941 West Virginia industries enlarged for war.

1945 Industries turned to meet peacetime demands.

Indian Days. The Indians used the West Virginia country only for hunting and fishing because the area was so rugged. Several important Indian trails crossed the region, and the warriors traveled over them to their hunting grounds or to raid the villages of other tribes. The Scioto-Monongahela Trail led southward from Pennsylvania through the present towns of Morgantown and Fairmont, then westward to cross the Ohio River at Parkersburg. The Seneca Trail ran from the mouth of the South Branch of the Potomac to the site of Elkins, where it joined the Warriors Trail to the south. The Kanawha, or Canoy, Trail ran between White Sulphur Springs and Huntington.

Exploration and Settlement. White men first saw the beautiful, fertile country that is now West Virginia from the crest of the Blue Ridge Mountains. These white men came in 1670 under the leadership of the German explorer, John Lederer. In 1671 Thomas Batts and Robert Fallam led an expedition into what is now West Virginia. Governor Spotswood of Virginia crossed the Blue Ridge range and the Shenandoah River in 1716, but he did not enter the present West Virginia. Various exploring parties visited the region within the next few years. In 1726 the first white settler, Morgan ap Morgan, built his cabin at Bunker Hill. Germans from Pennsylvania came in 1727, and founded a settlement at New Mecklenburg (now Shepherdstown). Other settlements were soon made, especially by the Scotch-Irish, the hardy pioneers who were always among the first settlers. The Indians objected to the white men who were taking over their hunting grounds, and often attacked the settlers. A number of the forts and blockhouses which had been built for protection later became towns and



cities. These included Fort Henry (Wheeling), Fort Lee (Charleston), and Fort Randolph (Point Pleasant). George Washington made an unsuccessful raid against the Indians in 1754, and Braddock was defeated by the Indians in 1755.

In 1763 King George III had forbidden the colonists to take up any land until treaties could be made with the Indians to allow peaceful settlement. The independent Scotch-Irish and the Germans and Dutch paid no attention to this order. The Germans and Dutch could not even read the English proclamation. The settlers pushed over the mountains into the forbidden green valleys in ever-growing numbers. They notched trees with their axes to mark their land claims. In 1768 the Iroquois gave up all the lands between the Alleghenies and the Ohio River, but Indian raids on the settlements continued.

The Allegheny Mountains separated Virginia's western settlers from the seat of the government in the east. The western settlers early developed a social and economic life quite apart from the life of the eastern settlements. The western people began to demand a separate government as early as 1771, and petitions were sent to England. The Revolutionary War halted these dealings with England, and when Virginia was made a state, the western region was included. The western settlers contributed their full share of effort in the war for independence, and provided both men and supplies. Indian armies led by British officers invaded the region three times between 1777 and 1782.

During the period after the war, western Virginia grew in industry and self-sufficiency. It developed a sharply different economy from that of the eastern part of the state. The two sections reached out in opposite directions commercially. The eastern trade was carried to the Atlantic, and the commerce of the western section found its main outlet through the rivers flowing west. The landowning, slaveholding aristocracy of eastern Virginia represented the larger part of the population and held the controlling power in state affairs. They fought against the public improvements which the western farmers and industrialists wanted. There were bitter disputes between the two sections over slavery, taxation, education, spending of public funds, and other problems.

The organization of West Virginia as a separate state finally came as a result of two rebellions in 1861. The state of Virginia rebelled against the Union, and then the northwestern counties rebelled against the mother state. When the Ordinance of Secession was submitted to the people of Virginia, a large majority in the northwest opposed it. When the Ordinance was adopted in April, 1861, the northwestern counties declared their independence, and they formed the Restored Government of Virginia. In August the western counties provided for the formation of a new state, to be named "Kanawha." In November, 1861, a constitution was drawn up, and the name of the proposed state was changed to West Virginia. The constitution was adopted by the people in 1862, and West Virginia was admitted to the Union as the thirty-fifth state on June 20, 1863.

Progress as a State. The new state furnished more than its share of troops to the Union armies during the War between the States. During the first struggling

years of West Virginia's independence, war was raging within its borders. After the war, in 1866, more than fifteen thousand men who had fought in the Confederate Army were not allowed the right to vote in the new state. This act was repealed in 1871, and a new constitution was adopted in 1872. Meanwhile, a new economic program was gradually changing the industrial character of the state, which resulted in a rapid growth of industry and population.

At the time of separation, Virginia insisted that West Virginia should pay a share of the state debt, although only one state institution had been built in the western territory. The problem continued to be an important issue in state politics until 1915. In that year the United States Supreme Court decided that West Virginia owed Virginia \$12,393,929. The final payment of the debt was made in 1939.

In the 1900's West Virginia became highly industrialized. The state used its great storehouse of natural resources to develop new manufactures. Both the raw materials and the manufactured products of the state were important in supplying the military needs of World War I.

During World War II, West Virginia poured a steady stream of supplies and needed materials from its busy farms, mines, factories, and chemists' laboratories. The state's vast resources were used to produce materials whose importance on the battlefield proved they could have even greater usefulness in the peacetime world. P. 608.

Related Subjects. The reader is also referred to:

BIOGRAPHIES

Baker, Newton Diehl	Jackson, "Stonewall,"
Buck, Pearl S.	Thomas Jonathan
Davis, John William	Morrow, Dwight Whitney
Gregg, William	Rowan, Andrew Summers
	Wilson, William Lyne

CHIEF PRODUCTS

Apple	Corn	Petroleum
Buckwheat	Glass	Plastics
Clay	Limestone	Rubber (Synthetic)
Coal	Lumber	Salt
Coke	Natural Gas	Sandstone

CITIES

Beckley	Clarksburg	Morgantown
Bluefield	Huntington	Wheeling
Charleston	Martinsburg	White Sulphur Springs

COLLEGES AND UNIVERSITIES

Bethany College	West Virginia State College
Concord College	West Virginia University
Marshall College	West Virginia Wesleyan
West Liberty State College	College

HISTORY

Brown, John	Virginia (History)	Washington,
Harpers Ferry	War between the States	George

PHYSICAL FEATURES

Allegheny Mountains	Ohio River
Kanawha River	Potomac River
Monongahela River	

UNCLASSIFIED

Food (Famous Foods of the States)

Books for Younger Readers

- AMBLER, CHARLES HENRY. *West Virginia; Stories and Biographies*. Rand McNally, 1942. Development of the state.
- CONLEY, PHILIP MALLORY. *Beacon Lights of West Virginia History*. W. Va. Pub. Co., 1939. Accurate and colorful history of the state.
- CONLEY, PHILIP MALLORY, and others. *West Virginia Yesterday and Today; a Textbook in the Geography, History, Resources, Industry and Government*. W. Va. Pub. Co., 1937.
- SKIDMORE, HUBERT. *River Rising!* Doubleday, 1939. Experiences of a young boy as a teacher in a lumber camp school in the hill country.

Books for Older Readers

- AMBLER, CHARLES HENRY. *West Virginia, the Mountain State*. Prentice-Hall, 1940. A history of state politics and government.
- CONLEY, PHILIP MALLORY, editor in chief. *West Virginia Encyclopedia*. W. Va. Pub. Co., 1929. The most comprehensive collection of information about the state and the people.
- KENNY, HAMILL. *West Virginia Place Names, their Origin and Meaning*. Place Name Press, 1946.
- LAMBERT, OSCAR DOANE. *Pioneer Leaders of Western Virginia*. Scholl Printing Co., 1935.
- LAMBERT, OSCAR DOANE. *West Virginia; a Guide to the Mountain State*. Oxford, 1941. (American Guide series.) A survey of the development of the state.
- An Outline suitable for West Virginia will be found with the article "State."

Questions

Why is West Virginia called "The Coal Bin of the World"?

What was the only change made in the map of the United States during the War between the States?

Where in the state is the center of the chemical industry of the United States? What reasons can you give for this?

Where in West Virginia is "the birthplace of rivers"? Why is it so-named?

What two well-known varieties of apples were first grown in West Virginia?

For what historic event is Harpers Ferry famous?

Why was West Virginia petroleum called "devil's grease" in early days? For what purposes was it once used?

Where in West Virginia was the first synthetic-rubber plant in the United States built during World War II?

What historic event might not have occurred if George Washington's road-building suggestions had been followed?

WEST VIRGINIA STATE COLLEGE is a state-supported, coeducational school for Negroes at Institute, W.Va. It has schools of liberal arts, agriculture, business administration, education, home economics, mechanic arts, engineering, and music. West Virginia State College was founded in 1891, and has an average enrollment of 1,000.

WEST VIRGINIA UNIVERSITY is a state-controlled, coeducational school at Morgantown, W.Va. It has colleges of arts and sciences, law, engineering and mechanic arts, agriculture, forestry, home economics, education, and pharmacy. There are also schools of music, medicine, mines, physical education and athletics, journalism, and military science, and a graduate division. The university was founded in 1867. Average enrollment is about 3,800.

G. J.

WEST VIRGINIA WESLEYAN COLLEGE is a coeducational school of liberal arts at Buckhannon, W.Va. It is controlled by the Methodist Church. The B.A. degree is granted. The college was founded in 1890 and has an average enrollment of about 450.

A.A.S.

WESTWARD MOVEMENT. Of all the work that went into the making of America, nothing was more important than the labor of the pioneers who blazed the trails toward the West. The pioneers slowly and heroically pushed the frontier toward the setting sun. They made it possible for others to follow, and to change a vast wilderness into a prosperous country of cities and farms. Men have pioneered in all countries since the beginning of time, but in no other land have they left so rich a heritage. America's democratic way of life may be traced chiefly to the three-hundred-year struggle of the pioneers on the shifting frontier.

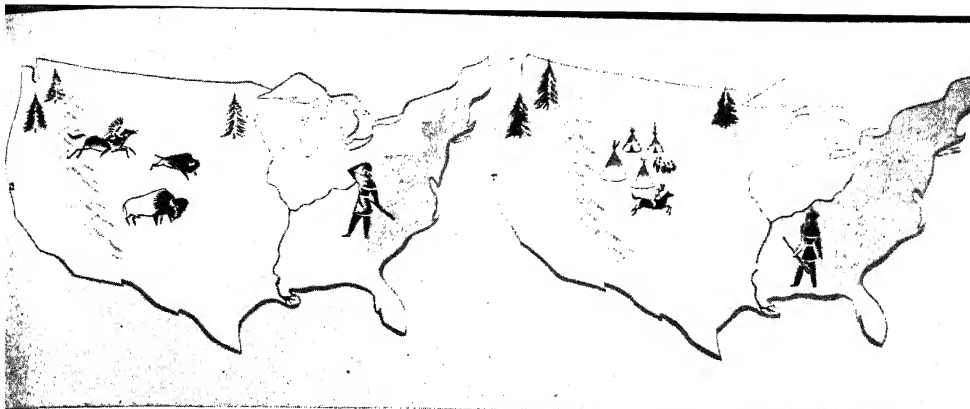
Among the pioneers were all kinds of men — explorers, trappers, soldiers, scouts, traders, adventurers, pathfinders, missionaries, farmers, and even ne'er-do-wells. Most of them were men and women who dreamed of a better world in which they and their families could live. They had the courage to turn their backs upon the comforts of civilization and venture into the little-known West to make their dreams come true. Frequently the pioneers had to fight with Indians, with wild beasts, and even with Nature itself for a chance to exist. At first, Nature was their greatest foe. She hemmed them in with forests, with mountains, and with lonely stretches of prairies and deserts. The pioneers had to be men and women of daring and self-confidence, who could take care of themselves and their families in times of danger and sickness.

As the shifting frontier moved westward, new obstacles, dangers, and struggles arose. People were constantly beginning their lives all over again. It is this beginning over and over again that has made American history so different from that of other countries. Out of it grew the strong American character. No matter where the pioneers came from, or why they sought new homes, most of them were self-reliant, courageous, inventive, persevering, industrious, adaptable, friendly, and helpful.

Daniel Boone might well be called the ideal pioneer. His feats were typical of the frontiersman. Other famous pioneers include George Rogers Clark, William Meriwether Lewis, Zebulon Pike, Sam Houston, Marcus Whitman, David Crockett, Brigham Young, and Kit Carson. It is to these famous men, and to the thousands whose names have long been forgotten, that the people of the United States owe thanks for what this country is today.

The Shifting Frontier

The First Frontier. The first frontier in America and the first "West" was within sight of the Atlantic Ocean. Here the early colonists settled in scattered communities. (See COLONIAL LIFE.) With the arrival of new colonists, it was not long before the early settlements spread in all directions. When the lands along the seaboard had been settled and the people became cramped for space, they began to push westward toward the foothills of the Allegheny Mountains. The Indians became less and less friendly as white men crowded into their



The Earliest Settlements in America were on the Atlantic seaboard. The "western frontier" was only a few miles inland.

lands. Finally, Indians were a constant source of danger. Frontier outposts became necessary to protect the older settlements.

By 1700, settlers from New York had built trading posts in the valleys of the Hudson and the Mohawk rivers. Pioneers had left Pennsylvania, Massachusetts, and Connecticut to build blockhouses in the foothills of the mountains. A rough line of defense against Indian attacks extended from New England to the Carolinas.

In 1716 Governor Spotswood of Virginia explored territory across the Blue Ridge Mountains into the Shenandoah Valley. Later, land grants were made and the settlement of the Shenandoah began in earnest. By 1730 pioneers from Virginia, and Scotch-Irish and Germans from Pennsylvania, had crossed the Susquehanna River and settled in the Cumberland Valley. New land policies of various colonies brought more people to the West. In 1731 the South Carolina assembly provided funds to survey new western lands. Georgia and Massachusetts took steps to encourage colonists to settle along the frontier. Also there were great migrations from northern to southern colonies, and then westward.

Beyond the Alleghenies. During the early 1700's many pioneer trappers, missionaries, and adventurers were traveling beyond the Alleghenies, alone or in small groups. On their return, they told their neighbors and friends of the unbroken forests and rich lands to the west. Hearing these glowing accounts, other men set out to see for themselves. There were other reasons, too, why so many people moved westward during this period.

Back on the coast there were many laws and restrictions which people did not like. They longed for a place where every man was as good as his neighbor. Many wished to start life anew, and these sturdy pioneers were willing to brave the hardships which they knew would face them so that they could make the new way of life they pictured come true. High prices and the scarcity of land east of the mountains explain why many people entered the region between the Alleghenies and the Mississippi River. These settlers wanted to take advantage of the opportunity offered by a new land law which was passed by Congress. They were eager to own their own land and to benefit from the rich natural resources which they believed would be found west of the settled communities.

A spirit of adventure and restlessness caused others to leave their homes. It is difficult for people today to

By the Middle 1700's, Many Settlers had crossed the Alleghenies and established homes and farms in former Indian territory.

appreciate the "cramped feeling" which many of the pioneers east of the Alleghenies said they experienced.

Kentucky and Tennessee. Pioneers went into Kentucky at an early date. In 1769 Daniel Boone left his home in North Carolina, passed through the Cumberland Gap, and came to the bluegrass region. He returned to his home in 1771, but in 1773 again went to the wilderness of Kentucky with other pioneers who were determined to establish permanent settlements. Trouble with the Indians compelled them to turn back, but by this time many people were interested in settling this land.

In 1774 James Harrod of Virginia, with a company of pioneers, floated down the Ohio River and then went up the Kentucky River to establish Harrod's Town (now Harrodsburg). In 1775 Boone made yet another attempt to establish a settlement, and was successful in founding the town of Boonesborough. This was the beginning of the permanent settlement of Kentucky. At the close of the Revolution about 3,000 settlers lived in the Kentucky area. See KENTUCKY (History).

The streams that flow into the Tennessee attracted settlers at an early date. In 1769 William Bean built a cabin on the Watauga River (see WATAUGA ASSOCIATION). Within a short time, over a hundred persons had arrived in this region to build homes. This was the beginning of the state of Tennessee. (See TENNESSEE [History].) John Sevier and James Robertson brought many bands of pioneers here. Robertson founded the city of Nashborough, which was later called Nashville. A constant stream of pioneers from the Carolinas began to pour into the rich lands of Kentucky and Tennessee.

Early Difficulties. As the pioneers settled west of the mountains, the French leaders in Canada became more and more angry because they considered the Ohio and Mississippi valleys their land. In 1753 Governor Dinwiddie of Virginia sent George Washington to warn the French to keep off British territory. But Washington found that the French were determined to hold the country. The quarrel between the French and British over this land resulted in the French and Indian War. The British won, and France gave Great Britain all the territory lying between the Atlantic Ocean and the Mississippi River, except New Orleans. The French were driven out of the Ohio Valley, and settlers from the seaboard entered the territory.

The settlers, however, did not have the support of

the British. The new king, George III, stated that the land west of the sources of the rivers that flow into the Atlantic Ocean should be set aside for the Indians. Little attention was paid to the King's so-called "Proclamation Line." The back-country people who had fought in the French and Indian War were not willing to have their way to the West barred by the order of a distant king. They settled in the western territory in spite of George III's proclamation.

The Northwest Territory. During the Revolutionary War, the British enlisted the help of the Indians in an attempt to drive the American pioneers out of the western lands. In 1778 George Rogers Clark with two hundred pioneers captured the British posts at Kaskaskia, Ill., and Vincennes, Ind. Thus the vast western territory, with the exception of Detroit, came into the possession of the Americans. After the Revolutionary War people began to rush into the new region which Clark had won. This land was called the Northwest Territory. It included the present states of Ohio, Indiana, Illinois, Michigan, Wisconsin, and Minnesota.

Early pioneers were attracted to Ohio, and Marietta was founded in 1788. An expedition of New Englanders floated down the Ohio River from Pittsburgh. They stopped at the mouth of the Muskingum River, and established the first English-speaking settlements in the Northwest Territory. The Northwest Territory grew rapidly, even though there were many Indians around Marietta and the pioneers had to spend much of their time defending their homes. But dangers did not keep settlers away. So rapidly was this western land occupied that its population increased from 100,000 in 1790 to nearly 400,000 in 1800. Most of the pioneers in the Northwest Territory came from New England and the middle colonies of Pennsylvania, New York, and New Jersey.

Lower Mississippi Valley. South of Kentucky and Tennessee, the westward movement did not begin until much later than in the North. This was due to lack of roads from the Carolinas and Georgia, the absence of rivers flowing westward, and the fact that the soil would not grow crops with which the pioneers were familiar. By the close of the Revolutionary War, however, much of the land of the colonial plantations of the South was "mined" out. It had produced tobacco, indigo, and rice for more than 150 years, and little had been done to keep the soil fertile. The stories of fertile soil to the west began to attract attention among southern plantation owners.

The movement of people into the Lower Mississippi Valley really began after the purchase of the Louisiana Territory in 1803. Mississippi and Alabama received settlers after the opening of the cotton fields in 1810, and thousands of southern families moved westward. The plantation owners took their Negro slaves with them. They traveled in long caravans of white-topped wagons, for the growing of cotton required many workers and large tracts of land. The settlements made by these Southern settlers were far apart, separated by large plantations many hundreds of acres in size.

Upper Mississippi Valley. Long before the purchase of the Louisiana Territory in 1803, public men and pioneers had been interested in the little-known lands

west of the Mississippi River. When Louisiana became part of the United States, President Thomas Jefferson asked Congress for an appropriation of \$2,500 for an expedition into the territory. In 1804 Meriwether Lewis and William Clark, a younger brother of George Rogers Clark, began their expedition into this vast wilderness (see LEWIS AND CLARK EXPEDITION), returning late in September of 1806. Another important expedition was that made by Zebulon Pike and his party in the same year. They explored what is now Missouri, Kansas, and Colorado.

These expeditions served their purpose well. From Lewis' and Clark's reports of the northwestern area and Pike's report on the southwestern lands, people gained a general idea of the whole vast West. The explorers had marked out great rivers, gained information about the western Indians, and kept records of animals seen in the explored areas.

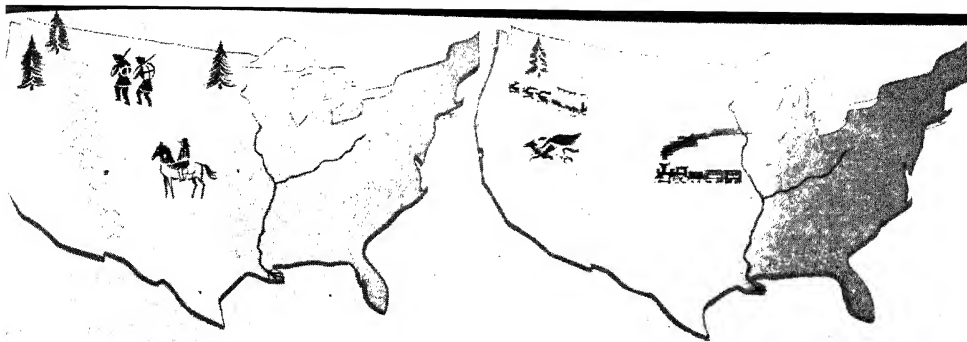
Explorations did not result in immediate settlement of this vast territory. But they served to mark the trails which later pioneers were to use, such as the Oregon, California, Mormon, and Santa Fe.

The Southwest. In 1822, one year after Mexico had gained its independence from Spain, Stephen F. Austin led a large number of pioneers into Texas, which was then a Mexican province. At first, settlements grew slowly, but by the middle of the 1830's some 20,000 pioneers lived there. The struggle of the Texan frontiersmen against the Mexican army, the story of Sam Houston at San Jacinto, and the slaughter of the Texans at the Alamo give us a vivid picture of the bravery of the pioneers in opening and defending the Southwest. In 1845, nine years after Texas gained its independence from Mexico, it became a part of the United States. After the Mexican War of 1846 to 1848, most of the present states of New Mexico, Arizona, Utah, Nevada, California, and a part of Colorado were added, and pioneer travel along the Santa Fe Trail became heavy.

The Oregon Country. After the return of Lewis and Clark from the Pacific Northwest, fur traders were soon following the rivers and trails northwestward. They established fur-trading posts in the Oregon country. Until 1840 there were more British than American settlers, but after that year, the number of American homeseekers increased. Nathaniel Wyeth led a band of pioneers to the Oregon country and founded a settlement, and Marcus Whitman established a mission there.

American settlers, who were eager to have the United States take possession of this region, poured into the area. Long lines of covered wagons carried thousands of settlers through the South Pass of the Rockies to the valleys of the Columbia and Willamette rivers. By 1850, soon after the United States and Great Britain had settled their dispute over the Oregon boundary, there were between ten and twenty thousand settlers in the Oregon country.

The Salt Lake Valley. Even before the Oregon question was settled, the Salt Lake basin in Utah was attracting settlers. The Mormons, who had been driven from one place to another because of their religious beliefs, were looking for a place to build new homes. In 1846 they left their settlements in Illinois and traveled across the Iowa plains as far as the Missouri River. Near



Large Sections of the Mississippi Valley and of the Northwest Territory had been settled by the early 1800's.

Omaha an advance guard of their group met Father De Smet returning from a missionary journey to the Northwest. The account which he gave of the Salt Lake basin may have decided the Mormons to settle in Utah. The country was dry and dreary, but it soon became famous as a land of plenty. Under Brigham Young's leadership, irrigation ditches were built to carry water from the near-by mountains, homes were erected, and a thriving community was established. Within two years, more than five thousand persons had settled near what is now Salt Lake City. See MORMON; UTAH (History); YOUNG, BRIGHAM.

California. When the Mexican War began in 1846, John C. Frémont and his soldiers helped the American settlers overpower the Mexicans. In 1848, when peace was signed with Mexico, gold was discovered in California on land owned by John Sutter where Sacramento is now located. Then came the famous rush of the "Forty-Niners" to the California gold fields. This was one of the most colorful chapters in the history of the West. Thousands of persons from eastern United States and from many other parts of the world rushed to California. Settlements known as "boom towns" grew up almost overnight. Some of them lasted and became permanent cities or towns. Others vanished almost as quickly as they had appeared.

Later, between 1858 and 1890, gold and silver were discovered at several points in the Rocky Mountains. Among these discoveries was one in the Pikes Peak area in Colorado in 1858. During the next two years more than one hundred thousand persons rushed to the gold diggings.

The Great Plains. For years the pioneers had traveled over the wide, rich great plains between the Missouri River and the western mountains, but had ignored the area as a place to settle because the plains appeared so desolate. This part of the country had been called the "Great American Desert" since Major Stephen Long's expedition of 1819. With the passage of the Homestead Act in 1862, each settler could have 160 acres of land upon the payment of a small fee, and by living on the land for five years. The first homesteader was Daniel Freeman, who settled near Beatrice, Neb.

Large numbers of immigrants from Europe joined the growing stream of people who, more and more, saw great opportunities to better themselves in the West. They joined the thousands of Americans who settled on

When the Transcontinental Railroad was completed in 1869, settlers could move freely and easily into the West.

the great plains to become free, independent farmers.

Later the homesteaders got into quarrels with the cattlemen, who were driving cattle north from Texas for shipment by rail to eastern stockyards. Homesteaders began fencing in their land with barbed wire, which destroyed the "range" and the "long drive" to the railroad lines. Earlier, the Indians had given way to the pioneers. Now the cowboys had to yield to the settlers and the ranch came to take the place of the range.

The Last Great Land Frontier. In 1889 the Oklahoma Territory was opened for settlement by the Government. The land was to be divided into plots of 160 acres, and each person was allowed to stake his own claim. At noon on April 22, when the signal gun was fired, thousands of land-hungry pioneers dashed into the area in all kinds of conveyances — on foot and on horseback, in carriages and carts and covered wagons, or "prairie schooners," and on slow-moving trains. There is a story which tells that one man even used an ostrich. In less than twenty-four hours, more than two million acres were staked out and claimed, and such cities as Guthrie, Stillwater, and Oklahoma City sprang up in a few hours' time. (See OKLAHOMA [History].) By 1893 all the good free land had been settled, and the last great frontier had vanished.

New Frontiers. The main tide of westward movement was over, but there was still opportunity for pioneers. The building of great dams and irrigation projects in the West sent precious water into lands that had been too dry for farming or ranching. Thousands of families settled on these new lands, especially in the Southwest. As late as 1947, homesteaders were taking up irrigated farms in the Gila reclamation project near Yuma, Ariz. Also during the 1900's, many farm families moved from the drought-stricken Middle West to a new life on the rich lands of Alaska.

As such opportunities became fewer, people with a pioneering spirit looked for new and different kinds of frontiers to conquer. Farmers and agricultural scientists pioneered in better ways to grow larger crops, and to keep the soil fertile. Physicians, surgeons, and laboratory researchers pushed forward to great new frontiers in the science of healing. Other scientists pried into the secrets of the atom, and at last stood on the horizon of a new age of atomic energy, which could bring untold benefits to man, or destroy him. As Americans gained more leisure, they had more time to devote to the arts

and to literature. Distinctive new types of art and writing developed in places that had been frontier country.

Educators pioneered in new methods of preparing children to become useful and intelligent citizens. And liberal leaders renewed and enriched the American pioneering spirit of democracy.

R.B.W.

Related Subjects. The reader is also referred to:

Conestoga Wagon	Indian Territory
Cumberland Gap	Lewis and Clark Expedition
Eric Canal	Louisiana Purchase
Flatboat	National Road
Gadsden Purchase	Northwest Territory
Gold Rush	Pioneer Life
Guadalupe Hidalgo,	Pony Express
Treaty of	Trails of Early Days
Homestead Law	Western Reserve

BIOGRAPHIES

Boone, Daniel	Frémont, John Charles
Carson, "Kit," Christopher	Lewis, Meriwether
Clark, George Rogers	Pike, Zebulon Montgomery
Clark, William	Smith, Jedediah Strong
Cody, William Frederick	Whitman, Marcus
Crockett, David	

WET CHINOOK. See CHINOOK (Wind).

WETTIN, *veh TEEN*, was the name of a royal family in Germany. It was founded in the 900's and took its name from a castle near Halle. One of its descendants founded the British House of Windsor. See also WINDSOR.

WEYGAND, *vay GAHN*, **MAXIME** (1867-), became one of the best known of French soldiers. He was born in Brussels, Belgium.



Acme

Maxime Weygand surrendered the French armies to Germany in World War II.

and was known as "Marshal Foch's shadow." In 1920 he commanded the Polish forces which defeated the Russian Bolshevik armies.

In the later 1920's and early 1930's Weygand was reported to be sympathetic with the French Fascist political groups, and in 1935 he was retired. In 1939 he was recalled and put in command of all French forces in the Middle East. After the Germans invaded France in May, 1940, he was put in command of the French Army and surrendered to the Germans a month later. He served as Minister of War in Marshal Henri Philippe Pétain's Vichy government and later became military and civil governor in French North Africa. After the Allied invasion of North Africa in 1942, the Germans arrested Weygand and held him prisoner until the German surrender. He was later charged with collaboration with the Germans, but in 1948 a French court found him not guilty.

F.S.M.

WEYLER Y NICOLAU, *weh E ler ee NEE koh LAH oo*, **VALERIANO** (1838-1930), MARQUIS OF TENERIFE, was a Spanish general who was appointed governor of Cuba in 1896. His cruel methods aroused such a storm of protest in the United States that the Spanish Government recalled him in 1897. Weyler was born on the island of Majorca and received a military education at Toledo, Spain. In 1868 he put down a number of revolts in Cuba and later fought in Spain against the Spanish rebels known as Carlists. In 1901 he was appointed Minister of War and served in this position for several years.

E.Mcl.

WEYMAN, *WAT man*, **STANLEY JOHN** (1855-1928), was an English writer of historical romances. He was born at Ludlow, Shropshire, and was educated at Oxford University. He wrote his first novel in 1890, after having practiced law for several years.

L.J.

His Works include *The Red Cockade*; *Under the Red Robe*; *The Long Night*; *Chippings*; and *The Lively Peggy*.

WEYMOUTH, *WAT muth*, **RICHARD FRANCIS** (1822-1902). See BIBLE (Accepted Protestant Versions in English).

WHALE. The largest animal that has ever lived on the earth or in its waters still exists. Not even the giant dinosaurs, which died out at the close of the Age of Reptiles, were as large or as heavy as a sulfur-bottom whale. One such whale which was killed off the South Georgia Islands, on the edge of the Antarctic, measured 111 feet in length and weighed about 90 or 100 tons.

The reason that whales grow to such an enormous size is because the water supports their bodies. A land mammal can get only as heavy as its legs can carry. A bird's body is limited by the weight its wings can support in the air. But a whale has none of these difficulties. It can keep on growing indefinitely.

Numerous evidences show that millions of years ago whales lived on land and walked on four legs. Indeed, small bones representing what remains of the hind limbs still exist buried within the whale's body, although they seldom show on the outside. The author of this article personally recorded one humpback whale in which the "legs" stuck nearly two feet outside the body. This, however, is the only known case.

No one knows why whales left the land to live in the water but when they did, their bodies changed in many ways. They became "streamlined" and fishlike in shape so they would offer less resistance to the water and could swim more rapidly. *But whales are not fish.* A fish breathes air by means of gills and soon dies if it is kept out of water. But a whale will drown, just like a man, if it is beneath the surface too long. Some persons think that whales spout water through their nostrils, but this is not true. When it is under water, a whale closes its nostrils tightly and holds its breath. Thus, the air contained in the lungs becomes highly heated and full of water vapor. When the whale rises to the surface, it "blows" suddenly. As the hot breath strikes the colder air it condenses, forming a column of cloudy vapor. A man can produce exactly the same effect when he breathes out warm air on a cold morning.

Fish are cold-blooded and the temperature of their blood changes with the temperature of the water. Whales, like land mammals, have warm blood which

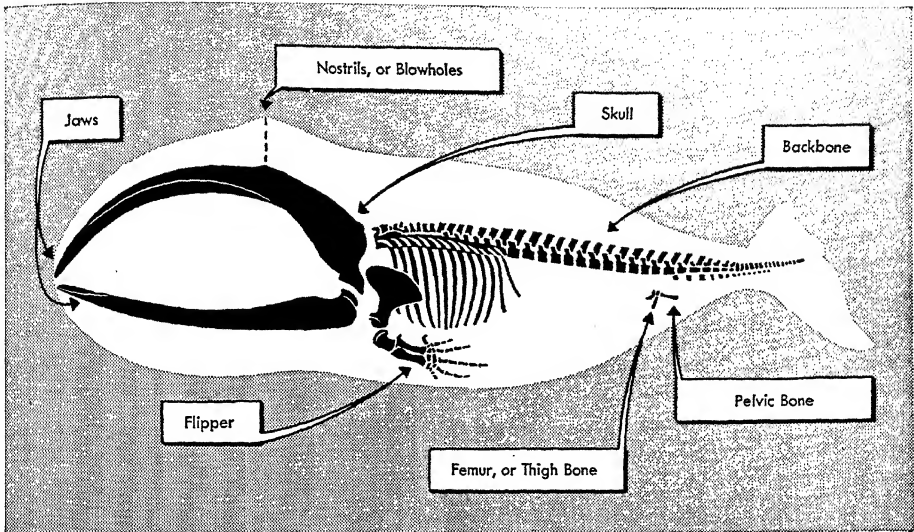


Diagram of the Greenland Right Whale Showing the Skeleton (in Black)

remains at the same temperature no matter how cold or hot the water in which they live may become. Whales have a layer of fat called *blubber* between the skin and the flesh, which keeps them warm. It acts just like our clothes, as a nonconductor of heat. In the winter we put on thicker garments to keep the heat of our bodies from being absorbed by the air. The colder it is, the more clothes we need to keep us warm. So it is with whales. Those that live in very cold water have thicker blubber than the warm-water species. The skin of all the large whales is thick but very soft.

Practically all land mammals except man depend upon body hair to keep them warm. We do not need hair because we wear clothes. Neither do whales because they have blubber. The scattered hairs that grow on the snout, chin, and on top of the head show that whales did have a pelt, millions of years ago.

Fish lay eggs, but whales give birth to their young alive and nurse them with milk as do land mammals. The milk is white and looks like cow's milk. The author tasted it several times but found it too strong-tasting to be pleasant.

In order that whales may breathe, or "spout," as soon as the head appears above the surface, the nostrils are on the very top of the head or the tip of the snout.

A whale has no sense of smell. The outer ears, which in a land mammal help collect the sound, have entirely disappeared. The ear openings are only about the size of a knitting needle. Water is such a good medium for carrying sound that outer ears are unnecessary.

The eyes are small for such big animals. Those of an eighty-foot sulfur-bottom whale are only about twice as large as the eyes of a cow. Whales have no tear apparatus, and cannot cry.

The whales have lost their hind legs, but they have developed flat, propellerlike, horizontal tails. In all

fish the tail is vertical. The front limbs have become overlaid with tissue and blubber to form paddles, but are used only for turning, balancing or rising to the surface. Only the tail, or "flukes" as it is called, gives forward movement.

There are many different kinds of whales but the two main divisions are:

- (1) Whalebone, or baleen, whales (*Mystacoceti*).
- (2) Toothed whales (*Odontoceti*).

In the first grand division whales have baleen, usually called whalebone, instead of teeth. Baleen is not bone at all, but a horny substance like your fingernails. The baleen is a series of thin plates, which hang in parallel rows on either side of the mouth. The inner edges of the plates are worn down into bristles which strain out the tiny crustaceans the whale eats. When the animal finds a mass of shrimps, it swims into them with its mouth open. The great fibrous tongue, weighing nearly a ton, squeezes out the water as the mouth is closed, leaving the food on the bristles. All the baleen whales have small throats because their food consists of such tiny animals.

The second grand group, the toothed whales, have simple peglike teeth which are well suited for grasping the slippery fish or squid upon which they feed. In the giant sperm whale the teeth are larger and slightly curved. The killer whale, the "wolf of the sea," has a really terrifying set of teeth. The food of the toothed whales is large, and so the throat is much bigger than in the baleen whales. But only the sperm whale could swallow a man. No human, however, under natural conditions, could possibly live in a whale's stomach, as he would be smothered immediately.

The stomach of all whales is complex and unlike that of any other mammal. Some species have as many as five or six compartments. The intestines are very long

and narrow and the liver is small with no gall bladder.

The size of young whales at birth varies with the size of the mother. The author recorded a 25 foot-baby in an 80 foot sulfur-bottom. It weighed about 8 tons. A 32-foot sperm whale contained a baby 14 feet 8 inches long and a 65-foot finback had a baby 22 feet in length. Of course, the babies could not grow so large if the mothers did not live in water which supports their bodies.

Whales do not bear young oftener than every two years. Usually there is only a single baby but the author has recorded several instances of twins. The mothers show a good deal of affection for their young and will seldom leave if the baby is killed.

No one can tell how long whales live. It used to be thought that they grew very slowly and lived several hundred years, but that was pure guesswork. Indications show they probably live less than 100 years. The author's own studies have shown that the young grow very rapidly for the first three or four years after birth.

Most whales like company and travel in schools, or herds, of from three or four to several hundred animals. They seem to get along well together and do not fight among themselves. Usually they are inoffensive and will seldom attack a boat or ship unless wounded. There are, however, instances of "rogue" sperm whales which have attacked ships without cause.

When whales blow or spout the noise is sometimes mistaken for a roar, but actually they have no "voice." How they communicate under water, as they undoubtedly do, is a mystery. This is only one of many facts concerning their life and habits which we do not know. Because they live in the open ocean, and appear at the surface only infrequently, one has to guess at what goes on when they are under water.

The author has seen a school of whales lying motionless at the surface for a long time. Undoubtedly they were asleep. Of course they could not sleep under water without holding their breath. Ordinarily whales do not

stay down very long by choice, unless their food happens to be deep. Fifteen minutes to half an hour is about the average dive for the baleen whales, but some of the toothed whales, for example the small bottlenose, have remained submerged for more than an hour.

We do not know how deep a whale can go. The author once saw a wounded whale dive straight down for more than a quarter of a mile. That it actually touched the bottom of the ocean is probable because it had struck with such force that its nose was torn and bleeding. The water pressure at such a depth would be enormous, but a whale's body can make adjustments to accommodate itself to such pressure. Many other observations show definitely that whales can dive to very great depths.

All the baleen whales feed at or near the surface where the shrimplike animals float in great masses. Some of the toothed whales, however, particularly the sperms, must go very deep to get the squid upon which they live. The bottlenose is another deep feeder.

The large whales have only one enemy other than man. This is the "killer," which is a whale also. It lives on seals and porpoises and will even devour baleen whales twice its own size. The author has seen a killer force its head into the mouth of a gray whale and actually tear out the tongue while others of the school bit off great chunks of the living flesh. Killers do not dare attack the huge sperm whale which apparently has no enemies except human ones.

Kinds of Whales

Baleen, or Whalebone, Whales

Bowhead. Length up to 60 feet. Black; head arched; baleen as much as 14 feet long; Arctic Ocean only. Feeds on crustaceans.

North Atlantic Right Whale. Length up to 55 feet. Black; head arched but not so much as in bowhead; baleen about 7 feet long. North and South Antarctic Oceans. Feeds on crustaceans.

Sulfur-bottom, or Blue Whale. Length up to 111 feet.



Ewing Galloway

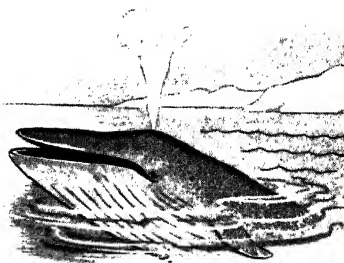
The Only Whaling Station in the United States is this one at Field's Landing in northern California. Great whaling

"factory ships" have replaced the land stations that once dotted both the Atlantic and the Pacific coast lines.

THE WHALE



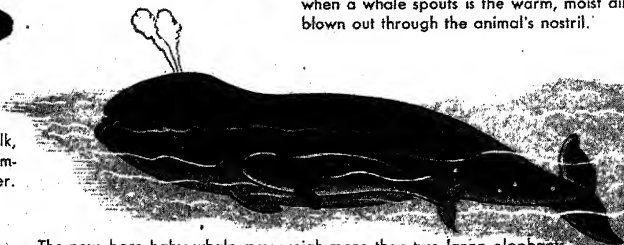
The Sulphur-bottom, or Blue Whale, may weigh about 50 times more than an elephant—the next largest mammal. It may be 100 feet long and weigh 150 tons.



"There she blows!" The column whalers see when a whale spouts is the warm, moist air blown out through the animal's nostril.



Despite its great bulk, the whale can leap completely out of the water.



The new-born baby whale may weigh more than two large elephants.



Whales can dive straight down to a depth of 2,000 feet.



THE TWO KINDS OF WHALES

Toothed Whales feed on fish and squids. Sperm and killer whales are toothed whales.

Baleen Whales, such as the right whale, feed on tiny crustaceans strained through the whalebone.

Blue-gray; spotted on sides and belly; has 62 to 88 folds on the throat and breast; a small dorsal fin; flippers about 8 feet long; baleen short, coarse, and blue-black. All oceans except Arctic. Feeds on tiny shrimps.

Finback. Most common of all large whales. Length up to 75 feet. Very streamlined body. Gray on back, white on belly; 50 to 60 longitudinal folds, baleen short, coarse, gray, striped with black; curved dorsal fin; flippers 3 feet long. All oceans except in Arctic ice. Feeds on tiny shrimps. Sometimes eats small fish.

Humpback. Length up to 55 feet. Black, splashed and circled with white in varying degrees; flippers very long, 15 feet; baleen black, short, and coarse; longitudinal folds broad. All oceans. Feeds on tiny shrimps.

California Gray Whale. Length up to 45 feet. Head slightly arched. Gray-black; only 2 or 3 folds on throat; flippers short, broad and blunt; only North Pacific on coasts of both Asia and America.

Toothed Whales

Sperm. Length up to 70 feet. Black, head enormous and rectangular in shape. Contains a great "oil tank" from which spermaceti is obtained. Sick whales yield ambergris, which is used as a base in expensive perfumes; 44 large conical teeth. Males much larger than females. All oceans, even in sub-Arctic and sub-Antarctic.

Bottlenose. Length up to 25 feet. Forehead bulbous; snout beaklike; teeth reduced. This species is representa-

tive of the family known as beaked whales (Ziphiidae) which includes four or five genera of small whales, none over 30 feet long. Never more than 4 teeth. All have pointed heads and low dorsal fins far back toward the flukes.

The family *Delphinidae* includes many toothed whales, all of which are small except the killer, which reaches a length of 25 feet. The porpoises, or dolphins, as they are sometimes called, are members of this family. They number many species and are found in all oceans of the world. Best known, perhaps, is the blackfish, which of course is not a fish; the narwhal of the Arctic with its long spiral tusk and the white whale, or beluga, of the sub-Arctic. The porpoises are sometimes taken for their skins, which make excellent leather. Oil from the jaws of porpoises is used for fine watches.

Whale Products. Oil from the blubber of right whales was at one time the fuel of lamps in all civilized countries. After kerosene was used, whale oil lost its importance for burning. Today it is used in soapmaking, for lubricating, for leather dressing, as an ingredient in oleomargarine, and in the manufacture of glycerine for explosives. Sperm oil is of better quality than other kinds, and is used for oiling delicate machinery, such as is found in sewing machines and watches.

Whalebone is used in mechanical brushes for which

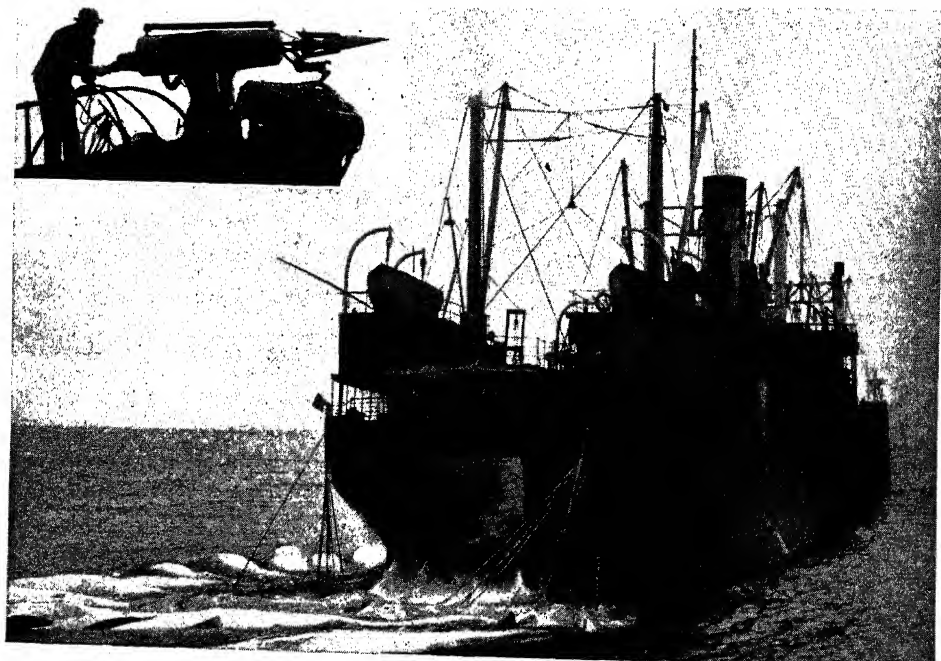
ordinary bristles are too soft, as stuffing for mattresses, and as material for handles on canes and umbrellas. The Japanese make fancy articles from it. Formerly, it was used in large quantities for umbrella ribs, stays in corsets, and as stiffening material in dressmaking.

Cattle feed and chicken feed are made from whale flesh and bone, and various parts of the carcass are made into fertilizer. The bone is rich in phosphates. Whale flesh is somewhat like beef, and is a favorite meat food of the Japanese.

Whaling Industry. In the days of sailing ships and the old-fashioned harpoon, whalers pursued the slower-moving right whales and the sperm whales, but paid little attention to the fast-swimming fin whales. New Bedford, Mass., was for years the world's center for the whaling industry, though English, Spanish, Dutch, French, and Norwegian whalers, as well as Americans, scoured the seas for the prey. Early in the 1800's, New London, Conn., developed as a great whaling port. The harpoons were then thrown from small whaleboats, and many were the exciting struggles before a whale was killed. Sometimes the contest was prolonged for hours, with the wounded creature alternately sounding (diving) and emerging for air time after time, whipping the sea into foam with its powerful tail, and perhaps spouting blood through its blowhole. When the struggle was over, the victim would be towed to the mother ship, where it was made fast and its blubber removed. The crew "tried out" (cooked) the blubber on board and stored it in vats, to be taken home and boiled for oil.

Modern Methods of Whaling. With the development of steam navigation and the invention of the harpoon gun, in 1865, whaling methods changed completely. The modern harpoon is shot from a gun and equipped with a bomb which explodes in three seconds after the whale is struck. It usually kills its victim instantly. Still more recent is the use of electric current for killing whales, a charged wire being fired from the harpoon gun. Radio and airplanes are used to give information of the movements of whale herds, and the pursuit is by fast motorboats and steam trawlers. After the whale is dead, the body may be hauled to the surface by a steam winch. Most whales, except sperm and right whales, sink when they are killed. Then the carcass is inflated by means of a tube and rubber hose attached to an air pump, until it floats like a balloon. It is then ready for the "flensers," who cut the blubber into sections to be pulled by the steam winch to the deck of the whaling steamer or the wharf of a whale-oil factory. First one side is stripped, then the other, and the blubber is boiled for oil and fertilizer. Factory ships are built and equipped to dispose of the catch far from shore.

Whalers can tell the different species of whales at a distance by their characteristic spouts. The porquals spout a single column; the blue whale, or sulfur-bottom, a very tall, thick spout; the humpback spouts a low, rounded cloud; the finback, a thin, high column; the right whale, a spout divided at the top; and the sperm whale shoots out a low, bushy puff, forward and upward.



Stern View of a Whaling Ship shows the opening through which dead whales are pulled aboard ship to be processed. Several whales are tied to the stern of the vessel, ready to be

hauled onto the deck by steam winches. Inset at upper left shows a powerful modern harpoon gun. An explosive charge in the harpoon kills the whale when it is struck.

American Museum of Natural History; Tomasselli, Public

SOME TYPES OF WHALES

WHALE, BLUE

The most important whaling grounds of today are in or near the Antarctic waters, especially near Ross Sea; off the southeast coast of Korea; off the California coast; off the Azores; and in Alaskan waters. The modern whaler is so efficient, that whales are in danger of being all killed off. There are estimated to be only a few hundred thousand whales in the entire world. To protect this remnant, a treaty was signed by many of the countries engaged in the whaling industry. The United States ratified the treaty in June, 1932. In 1946 the United States and eighteen other countries agreed to a new set of rules for the industry. R.C.A.

Related Subjects. The reader is also referred to:

Ambergris	Dolphin
Animal (color plate, Arctic	Grampus
Lands and Seas [Right Whale])	Narwhal
Beluga	New Bedford
Blackfish	Porpoise
Blubber	Rorqual
Cachalot	Spermaceti
Cetacean	

Questions

What is the largest animal that has ever lived?
 Why is it that a whale cannot cry?
 Why can whales grow larger than any land animals?
 Is a whale a fish?
 What has happened to the whale's legs?
 Can a whale drown?
 Can a whale smell?
 Does a whale have a voice?
 What actually happens when a whale "blows"?
 What do baby whales eat?
 Why doesn't the whale need outside ears?
 Could a whale swallow a man?
 How much may a newborn whale weigh?
 How long do whales probably live?
 How long can whales stay under water?
 What is ambergris? For what is it used?

WHALE, BLUE. See RORQUAL; WHALE.

WHALEBONE. See WHALE.

WHALES, BAY OF. See AMUNDSEN, ROALD; ANT-ARCTIC (map).

WHARF. See DOCK; PIER.

WHARTON, EDITH NEWBOLD JONES (1862-1937), was an American novelist who was noted for her stories about society life. She had a finished style, and produced clear-cut characters. Edith Wharton first won notice in 1899 for her collection of stories *The Greater Inclination*. Her novel *The Age of Innocence* won the Pulitzer prize for fiction in 1921. Edith Wharton was born in New York City, and was educated in private schools. She spent her later years in France. L.C.W.

See also PULITZER PRIZES.

Her Works include *The Valley of Decision*; *The House of Mirth*; *Ethan Frome*; *The Glances of the Moon*; *Twilight Sleep*; *Hudson River Bracketed*; and *The Gods Arrive*.

WHATELY, HWATT *lit.*, **RICHARD** (1787-1863), was an English clergyman and religious writer. In his religious writing, Whately appealed to the intellect rather than to sentiment. *Christian Evidence*, his book on the proof of Christian doctrine, was used as a textbook in English schools. Whately was born in London and was educated at Oxford University. In 1814 he became a preacher. In 1829 he was named professor of political economy at Oxford. Two years later he was appointed Protestant archbishop of Dublin. w.w.s.



Right Whale



California Gray Whale



Humpback



Sperm Whale



From Models at the American Museum of Natural History

Killer Whale

WHEAT



Ewing Galloway

WHEAT. Wheat furnishes the chief food for hundreds of millions of people in the world today. Every month of the year, in some part of the world, machines rumble across countless fields, reaping the golden harvest that means food to people of all races. The white races prize wheat more highly than any other grain. More pounds of wheat are produced in the world than of any other small grain. Next to rice, it is the most widely used human food. The only reason that more people eat rice is that rice is cheap. It is used in the thickly populated areas of the Orient where people have less of other things to eat. Failure of a wheat crop means human suffering, even with today's speedy means of transportation. But it usually does not mean life or death as it did at one time.

Wheat is so important that nations which do not produce enough for their own use are sometimes willing to wage war to gain control of land areas where much wheat can be grown. And wars may be won or lost because of good wheat harvest, crop failures, or because an air or sea blockade may stop the normal shipments of wheat from overseas. For several years before World War II, Italy tried hard to get her people to raise more wheat.

Wheat has played an important part in the dramatic story of the human race since very early times, long before man learned to say "Give us this day our daily bread." Wheat, more than any other crop, has furnished the energy necessary for the development of ancient and modern civilizations.

Origin and History

No one knows exactly how or when ancient man discovered that grains of wheat were good to eat. Scientists who have studied the origin of wheat believe that

WHEAT

common wheat originated in southwestern Asia. This is the kind of wheat from which our bread is usually made. The kind of wheat used for macaroni came from Asia Minor, Ethiopia, and the areas around the Mediterranean Sea.

Early History. Wheat furnished the main food of the ancient Egyptians, Assyrians, Greeks, and Romans. These nations were able to make their great contributions to civilization only because it took less labor to produce wheat than other food crops. Thus they had more time to develop the arts and sciences. Another great advantage of wheat as a food was that it could be stored for future use. In this way the people could avoid famine in years of crop failure caused by drought, insects, or diseases. Grain storehouses have been found in many ancient cities. Wheat was usually called "corn" in the Bible. We know wheat was important as a food crop in Palestine and Egypt because the Bible has many references to the production, storage, uses, and diseases of wheat. Theophrastus, a Greek philosopher who lived about three hundred years before the time of Christ, wrote about the many kinds of wheat grown in the countries along the Mediterranean Sea. It was also grown in China several hundred years before the time of Christ. In many parts of China, wheat is still considered sacred.

Grains of wheat that look much like modern varieties have been found in remains from the Stone Age in England and in the prehistoric lake dwellings in Switzerland. They have also been found in the tombs of the Pharaohs in Egypt, which are more than 5,000 years old, in excavations of the ancient cities in Mesopotamia, and in other places in southwestern Asia. Some of these grains are 6,000 years old. They are blackened, and would not grow, even though they have kept their original size and shape. We do not know the ancestors of wheat, but wheat cultivation goes further back than the earliest records of man. Present-day varieties could not exist in the wild state and would soon die out without the care of man. Probably the best-known types of wheat today are the result of interbreeding among more primitive members of the grass family to which they belong.

In the Americas. Columbus brought the first wheat into the Western Hemisphere when he visited the West Indies in 1493. Cortes took wheat from Spain to Mexico in 1519. From there it was carried by the Jesuit and Franciscan missionaries into what is now Arizona and California.

Wheat was planted by Bartholomew Gosnold at Buzzard's Bay, Mass., in 1602. Seed brought by the colonists was grown at Jamestown, Va., at least as early as 1618. The Pilgrims soon planted wheat after they settled at Plymouth, Mass. But wheat did not grow as well as corn in many sections along the Atlantic Coast. Wheat became more widely grown when western New York and the Ohio Valley were settled by the intrepid pioneers, during the latter 1700's.

In the United States. In the Pacific Northwest, wheat was grown at the Fort Vancouver (Wash.) trading post of the Hudson's Bay Company as early as 1825. Wheat became one of the most important products shipped from the West to the East as soon as canals were built

and used for shipping. Wheat was grown in the coastal sections of southern California in the early 1700's. But the rapid growth in wheat raising in the Sacramento, San Joaquin, and other valleys did not take place until after the gold rush of 1849. By 1860, Indiana and Illinois had become the leading wheat-producing states. Wheat acreage in Minnesota and the Dakotas increased rapidly as these areas were settled by immigrants from Europe. Red Fife, a new variety of spring wheat from eastern Canada, grew well in these states and helped increase acreage. A similar growth took place in Kansas and Oklahoma in 1873 when Mennonites from Russia settled in Newton, Kan. They brought with them a new variety of winter wheat called *Turkey*. Between 1870 and 1890 the acreage of wheat east of the Cascade Mountains in Washington and Oregon increased rapidly. A world shortage of wheat soon developed after World War I began. Wheat acreage in the United States was greatly increased, especially in Kansas and Oklahoma. The development of large-scale power machinery played an important part in this expansion.

Harvesting the World Wheat Crop

Harvesting the world's wheat crop is an around-the-year task. In different parts of the world, wheat is reaped and harvested during every month of the year, as shown below.

January: Argentina, Australia, Chile, and New Zealand

February: India

March: India and upper Egypt

April: Algeria, Asia Minor, lower Egypt, India, Iran, Mexico, Morocco, and Tunisia

May: Arizona, southern California, China, Japan, Spain, and Texas

June: China, southern France, Greece, Italy, Portugal, Spain, Turkey, and the United States south of about 40° north 40° latitude

July: Bulgaria, southern England, France, Germany, Hungary, Rumania, the Soviet Union, northern United States, and Yugoslavia

August: Belgium, Canada, Denmark, England, The Netherlands, the central part of the Soviet Union, and northern United States

September and October: parts of Canada, the northern Soviet Union, Scandinavian countries, and Scotland

November: Argentina, Peru, and South Africa

December: Argentina and Australia

How Wheat Is Grown

Wheat grows best when it is rotated with other crops such as corn, oats, clover, timothy, and soybeans. Unfortunately, however, these crops do not grow well in most of the areas included in the major wheat regions of the world. Wheat is often grown on the same land year after year in these areas. In some places the land is allowed to remain idle every other year.

Preparing the Soil. The method and time of preparing land for wheat depends largely on the kind of crop grown on the land before. Usually, land is plowed some time before planting so that moisture and available plant food will accumulate in the soil. In the southern Great Plains area, land is usually worked soon after harvest with a one-way disk, plow, or lister. An occasional cultivation between plowing and seeding keeps weeds under control and gets the soil in proper condition for the seed. Land is often plowed early in the spring and

cultivated during the long hot months of the summer.

In many of the spring-wheat regions and the central states, corn is grown one year and wheat the next. Where this happens land is often prepared by disking. This is also true in the central states where a wheat crop often follows soybeans. Fertilizers are seldom profitable in the major wheat regions, but in the central and eastern states and in European countries fertilizers carrying phosphorus and potassium are often applied at seeding time. Nitrogen usually can be supplied more economically by including legumes (such as red clover, alfalfa, peas, and beans) in the crop rotation.

Sowing. Methods of sowing wheat have changed greatly since colonial days. Then the seed was broadcast by hand. Today the common method in this country is to seed with an implement known as the grain drill. Drilling saves seed, increases chances of sprouting, reduces winter injury, and results in higher yields. In drier areas wheat is drilled in rows six to fourteen inches apart, and the seed is covered to a depth of from one to two inches. In the Great Plains area, from three to five pecks of seed are used for each acre planted. In the moist sections of the East, and on irrigated lands, the amount of seed needed varies from six to eight pecks per acre.

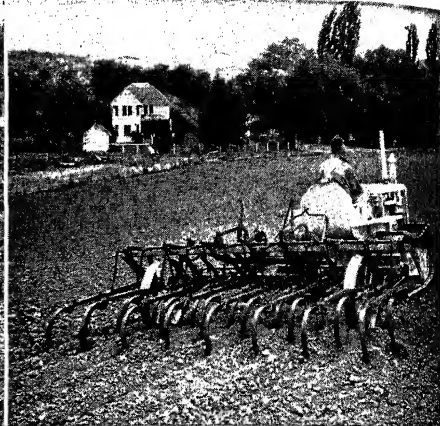
Winter wheat should be planted early enough so that the plants get a good start before winter. Spring wheat should be planted as early in the spring as the land can be properly prepared. The period from seeding to harvest for winter wheat varies from seven to eight months in the southern Great Plains area to eleven or twelve months in Montana. The period from seeding to harvest for spring wheat is usually three and a half to four months.

When kernels are planted they absorb moisture and germinate, or sprout, if oxygen is present (as it is in the soil) and temperatures are favorable for growth. The material stored in the endosperm (see illustration, Segments



Sowing Wheat by Hand. Wheat was planted in this way for thousands of years before the machine age in agriculture.

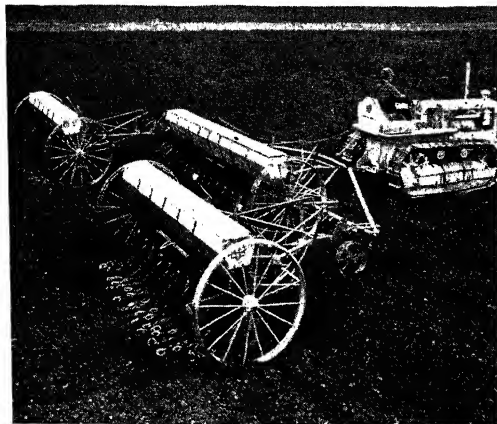
FROM WHEAT SEED TO BREAD



Before wheat is planted the soil is plowed, *upper left*. Implements used may vary from the ox-drawn wooden plow of the more backward countries to this many-bladed,

tractor-drawn type. After the plowing is completed the soil is harrowed, *upper right*, to pulverize the lumps, keep the weeds under control, and prepare for the seeding.

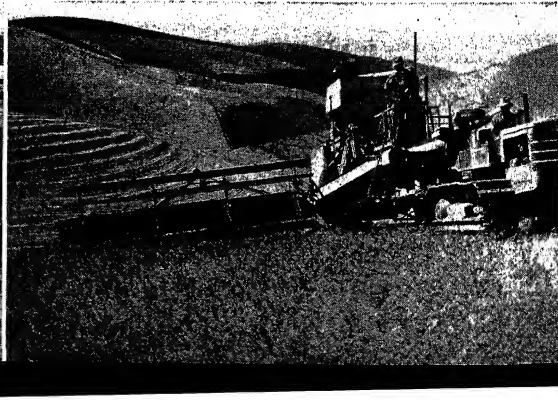
Photos: Case; Caterpillar Tractor

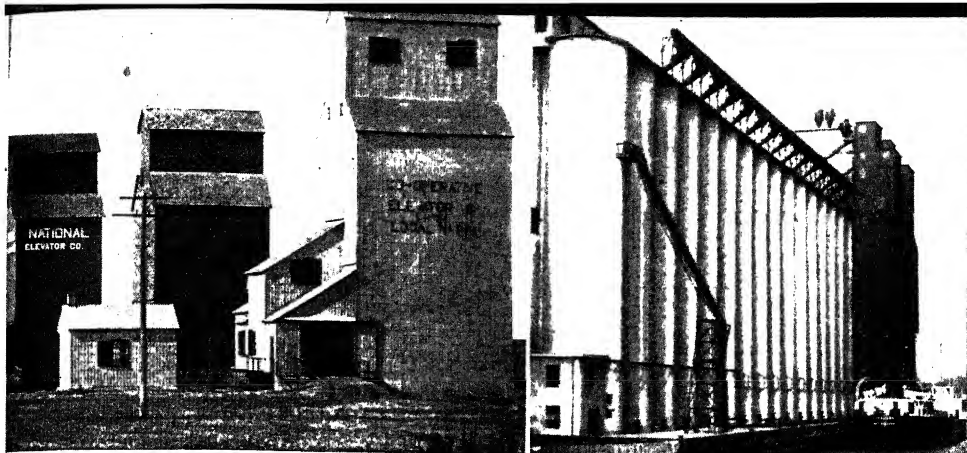


On large farms, tractor-drawn drills, *second left*, as many as 120 acres in one working day. When ripens, it is reaped and tied into sheaves, *second*

lower left. A combine, *lower right*, reaps and threshes operation. This is a wheat farm in the rolling country of the state of Washington.

Photos: Caterpillar Tractor; U.S.D.A.; Case; International Harvester

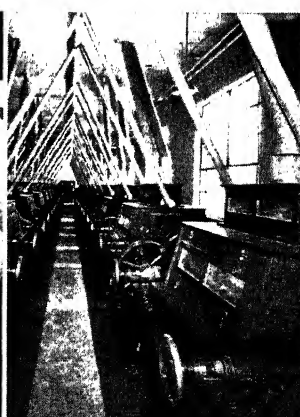




After it has been threshed, the wheat is often weighed and stored in local elevators, *upper left*, before it is shipped to the terminal elevators in large cities, *upper right*. From

there, the wheat, *second left*, is sent to the flour mill or is shipped abroad. Notice the grain boat that has brought a load from the farmlands to this Buffalo, N. Y., elevator.

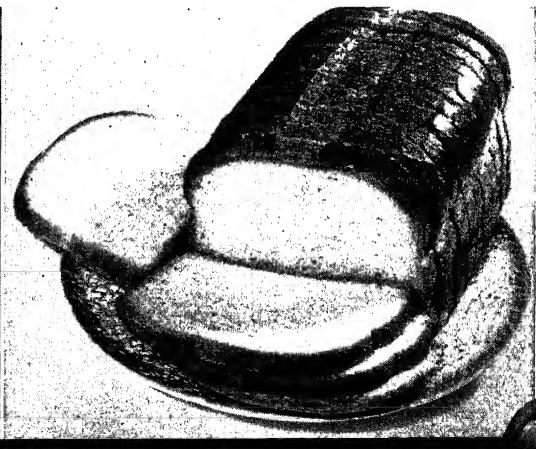
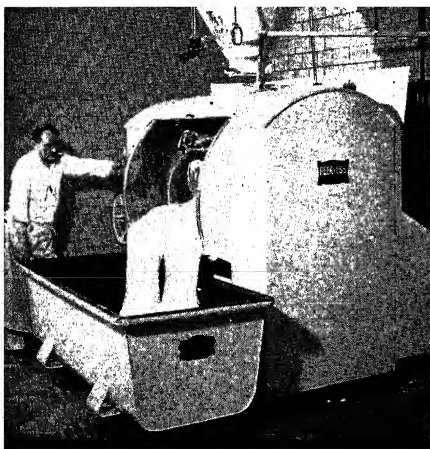
Photos: James Sawdery; Keystone; Triangle



To make sure that the wheat is of the proper grade and quality, inspectors with a specially devised stick examine samples of the grain, *center above*. The flour mill, *second*

right, grinds the grain into flour, bran, shorts, and middlings. At the bakery, *lower left*, the dough is kneaded by machine and then baked into bread, *lower right*, and other products.

Photos: European; General Mills; Baker's Helper; Black Star



and Cross Section of a Grain of Wheat) serves as food for the young plant until it pushes above the ground. It then develops chlorophyll (green coloring matter) so that it can use the energy from the sun in manufacturing food. The young green plants grow rapidly when the temperature is warm and moisture is available in the soil for its needs.

The Wheat Plant. Wheat is a member of the grass family and it looks like grass, especially when young. The heads which bear the kernels are produced at the tops of slender stems. The head consists of several spikelets arranged on opposite sides of a jointed central stem which extends from the main one. Each spikelet usually contains two or three flowers all enclosed by two *glumes*, or chaffy scales. Each flower consists of two flowering glumes called the *lemma* and *palea*. These enclose a feathery pistil and three stamens. Pollen from the stamens fertilizes the seed in the pistil. The seed then grows to form the kernel. The kernel is covered by the bran coats. Inside these at one end is an embryo wheat plant. The remainder of the kernel is made up of endosperm which is the portion that goes into flour. If the wheat has a beard, it is attached to the tip of the lemma. After the glumes are threshed, they are called chaff. The stems and leaves are called straw.

Natural Hazards. Many factors may harm wheat between planting and harvest. Winter wheat planted too early in the fall is in danger of damage from insect pests in many areas. However, it must be planted early enough to get properly started before severe weather comes. The major wheat regions of the world are semi-arid or dry lands, and so crops are often small because of drought. After a very severe drought in Kansas in the summer of 1934, and another in the spring of 1935, only about half of the 13,438,000 acres planted the previous fall were harvested in 1935. Severe winters may also damage the crop. For example, in 1928 from 60 to 65 per cent of the acreage planted to winter wheat in Illinois, Indiana, and Ohio was so badly damaged that the fields were plowed up and planted to other crops.

Harvesting. Methods of harvesting have varied in different ages just as they vary today. The sickle, which was invented before recorded history, was probably the first implement used for harvesting grain. The sickle is still used in some places. The Romans used it, as well as a crude form of the scythe. The cradle, which was developed near the end of the 1700's, had wooden fingers attached to the scythe so that the grain could be laid in bundles. The cradle was considered a great achievement, for with it one man could cut, bind, and shock an acre of wheat in a ten-hour day. It had taken two days to do this with the sickle.

Harvesting methods were not greatly changed until 1831, when Cyrus H. McCormick developed the first successful horse-drawn reaper. This machine had a knife four and a half feet long which cut the grain. It cut the stems and placed them on a platform directly behind the knife. A man walking alongside raked the wheat from the platform, and other men then gathered the stems and tied them into bundles. About 1880, still more speed was developed when John F. Appleby made a successful mechanical device for tying the bundles with twine.

Threshing. Different peoples in different times have used various methods for threshing. At first, man probably rubbed the grain out of the chaff with his hands. Then the flail was developed. The flail was a stick about two feet long fastened by a loose leather strap to another stick two or three times as long. The flail was used to beat the grain from the ear. Grain was sometimes tramped out by animals driven round and round the threshing floor. After the wheat had been threshed either by flail or animal, the grain was poured from one pan to another to let the wind blow away the chaff. This was known as winnowing. The widespread use of threshing machines in which revolving cylinders beat the grain from the heads began in the United States about 1830. By 1850 the machines for threshing and separating the straw and chaff from the grains had been combined into one.

Harvester-Thresher. The combined harvester-thresher, or *combine* as it is commonly called, was first used commercially about 1880. Until about 1920 it was used mostly in the Pacific Coast states. It could be used especially well there because storms seldom take place in this area during the harvest season. The use of combines in the Great Plains area also increased rapidly during and after World War I because of the demand for labor-saving machinery and the high price of grain. Then small combines were developed which could harvest other crops as well as grains, and the use of combines spread into the eastern states. Large combines with a twenty-foot cutter bar can harvest as many as five acres an hour.

Marketing. Before labor-saving machinery was developed and wheat could be grown in large fields, each farmer hauled his own grain to the mill. The miller ground it into flour, and kept a part of the grain as his pay. He could sell or trade this portion. Present-day marketing of wheat is complicated compared with this early barter system. Today the farmer hauls his grain to the local elevator. Here it is weighed and dumped into a pit. Then it is lifted from the pit in small buckets on an endless belt to the top of the elevator where it can be dropped through tubes to any one of several bins. Wherever possible, all wheat of the same quality is stored in the same bin. Sometimes it is loaded directly into railroad cars for shipment to mills or large elevators at such terminal markets as Chicago, Minneapolis, Kansas City, Portland, Buffalo, and St. Louis. The wheat shipped to a terminal elevator may be sold for export to a foreign country or to a mill for grinding into flour.

Effects of Modern Implements. The development of civilization follows closely the improvements in the efficient production of wheat. So long as men had to devote all or most of their energy to producing just enough food for existence, there were poverty and hunger for the many, and riches and leisure for the few. In fact, it was nearly the end of the 1700's before the inventive genius of man turned to more efficient production of the necessities of life. Once this was done, progress in many fields was surprisingly rapid.

No very great progress was made in reducing the amount of man-labor required to produce an acre of wheat until about 1800. The implements and methods

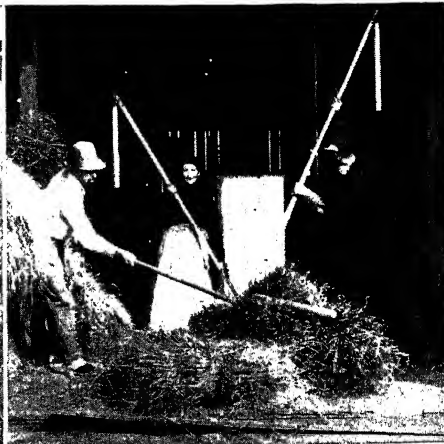
WHEAT FARMING OF EARLY DAYS



Until the nineteenth century, methods of harvesting and threshing wheat were very crude. For about 4,000 years, the sickle (inset) was the most common implement used in

harvesting until the scythe, *upper left*, was invented. With the invention of the scythe and cradle, *upper right*, the wheat was laid in rows ready for binding as it was cut.

Photos: U.S.D.A.

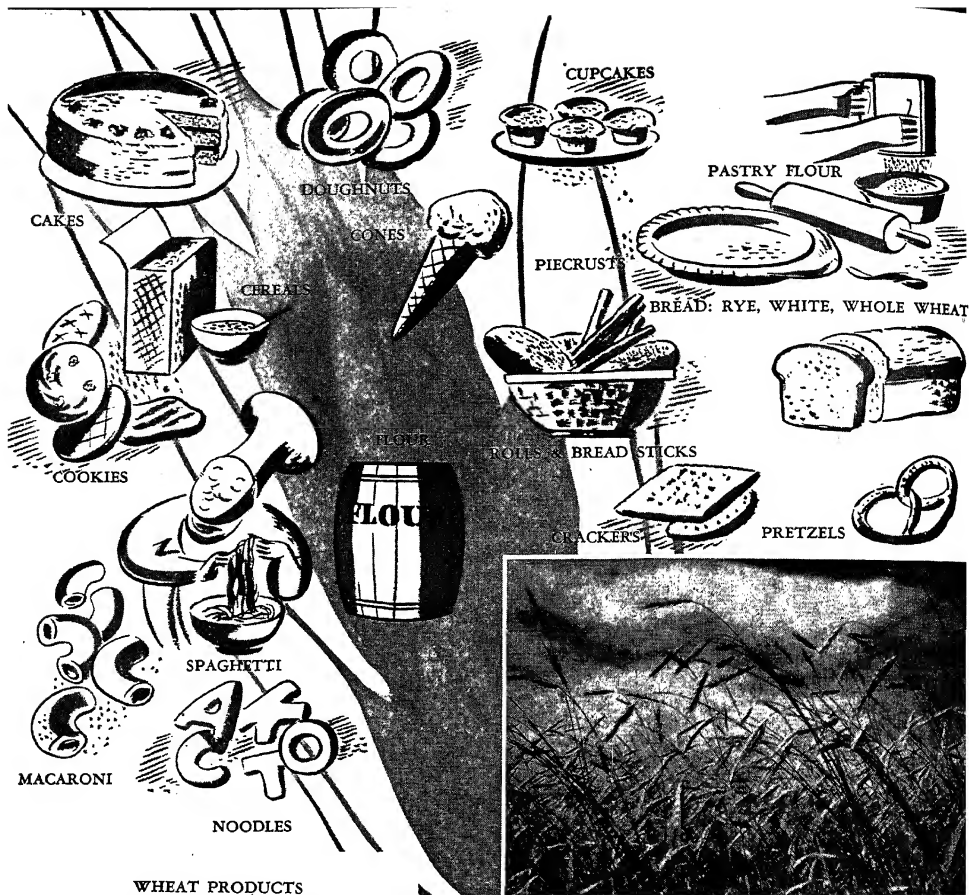


In 1831, the invention of the McCormick reaper, *second left*, revolutionized wheat farming, enabling fewer men to harvest more wheat in less time than ever before. Triangular blades, driven back and forth by power from the bull wheel of the reaper, cut down the grain, which was then

raked into swaths and bound by hand. The most common threshing practice was to use the flail, *second right*, to beat the ears of wheat and separate the grain from the chaff. This method fell into disuse with the invention of the early threshers, *below*, motive power being supplied by horses.

Photos: Paul; Case

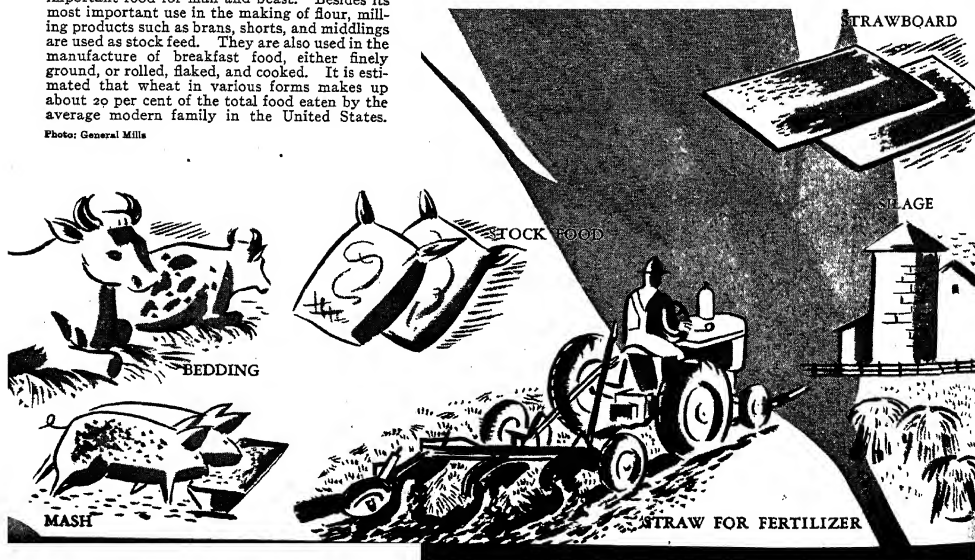




WHEAT PRODUCTS

Wheat, developed from once-wild grasses, is an important food for man and beast. Besides its most important use in the making of flour, milling products such as brans, shorts, and middlings are used as stock feed. They are also used in the manufacture of breakfast food, either finely ground, or rolled, flaked, and cooked. It is estimated that wheat in various forms makes up about 20 per cent of the total food eaten by the average modern family in the United States.

Photo: General Mills



available in 1830 were the walking plow, hand seeding, sickle, and flail. It is estimated that about fifty-eight hours of man-labor was required to grow, harvest, thresh, and clean an acre of wheat yielding twenty bushels. By 1896 the hours of man-labor had been reduced to nine. Implements available in 1896 included the gang plow, broadcast seeder, binder, and thresher. By 1940 the use of tractors, the combine, and other improved power machinery had reduced the hours of man-labor required to about three an acre.

After the reaper and thresher were invented, men were released from farm labor to build the railroads. Great industries could then be centralized in cities because food and transportation were available. Without the reaper and thresher, which reduced the number of men needed at home to produce food for the Northern armies, the War between the States might have ended differently. In the South, slaves supplied labor for working the plantations while their masters were fighting for the Confederacy, but in the North, the land owners themselves had to raise the food. The reaper solved this problem for northern farmers.

How Wheat Is Used

Each year in the United States about 490,000,000 bushels of wheat are milled into flour, 10,000,000 bushels are used in making breakfast foods, 75,000,000 bushels are saved for seed, and from 30,000,000 to 500,000,000 bushels are fed to livestock. The amount fed to livestock was unusually large during World War II. The by-products, bran, shorts, and red-dog flour obtained in milling, are also used as feed. The yearly use of wheat for the production of alcohol used in the making of synthetic rubber and munitions was more than 100,000,000 bushels during the war period. Wheat is also used for making flour paste, filler for dust preparations with which to destroy insects, and for coffee substitutes. The total domestic consumption in the United States in peacetime is about 700,000,000 bushels. Exports of wheat and wheat flour over a period of twenty-five years have been as high as 263,000,000 bushels in 1921 and as low as 4,000,000 bushels in 1935.

The yearly food consumption of wheat in the United States is about 3.7 bushels per person. Most of this is milled into flour. The miller knows that each product, such as bread or cake, must be made from flour from a certain class of wheat. So in buying grain, he specifies the class desired. Flour may be sold to stores for resale to housewives, to bakeries which sell it to stores, or direct to consumers in such forms as bread, light rolls, cake, crackers, cookies, piecrusts, doughnuts, noodles, cones, and pretzels. It is estimated that in the United States about 44 per cent of the flour is used in bakeries; 43 per cent in homes; 10 per cent in restaurants, hotels, and public institutions; and 3 per cent is manufactured into macaroni and similar products.

Semolina and farina wheat are used to make macaroni, spaghetti, vermicelli, and other similar products. Semolina is milled from durum wheat and is ground much coarser than flour. Farina is a similar product made from hard wheat.

Many breakfast foods such as puffed wheat, wheat flakes, bran, whole-wheat meal, wheat-cream meal,

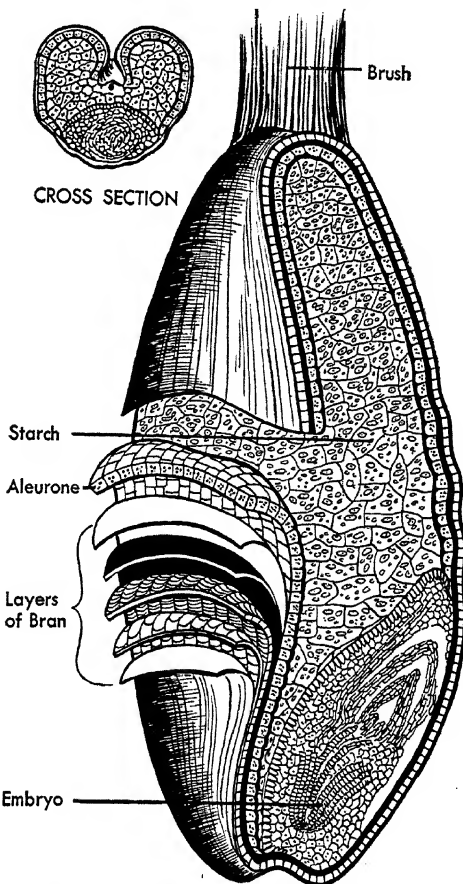
shredded wheat biscuits, and malted cereals are made from wheat. Some cereals are made from the entire kernel while others are made from certain parts of the grain.

When wheat is cut with a combine, the straw and chaff from the harvest are usually scattered over the field and plowed under to supply humus to the soil. East of the Mississippi River, however, straw is often used as bedding for livestock. An increasing amount is also being used in making paper, strawboard, and similar products.

In 1940 the United States Department of Agriculture established a laboratory at Peoria, Ill., to discover and develop new industrial uses for wheat, corn, and other grains. This was intended to increase world markets for wheat during difficult economic periods.

Composition

Wheat has become an important food of the white races because it is the only grain that contains gluten. Gluten is an elastic protein substance necessary for making light bread. Because of its gluten, wheat makes more palatable bread than other grain. The chemical com-



Segments and Cross Section of a Grain of Wheat

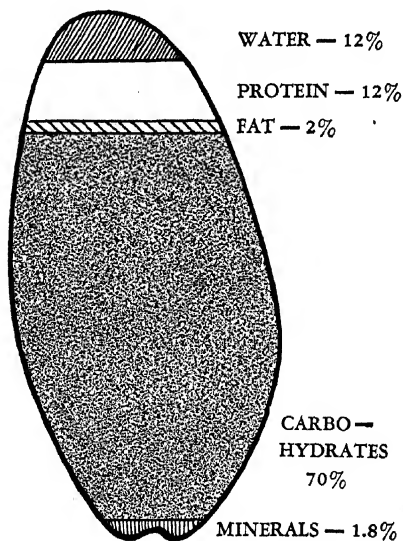
position of wheat is greatly influenced by environment. In general, wheat produced in dry climates is higher in protein and lower in carbohydrates than that grown in damp climates. An average sample contains about 70 per cent carbohydrates, 12 per cent water, 12 per cent protein, 1.8 per cent minerals, 2 per cent fat, and 2.2 per cent crude fiber. A pound of wheat yields about 1,600 calories. Vitamins B and E are present, particularly in the germ. These vitamins are largely removed from white flour in milling. But in recent years methods have been developed for returning some of the germ and for adding vitamins and minerals to the flour. Vitamin A is also present in small quantity in the yellow pigment of flour. See VITAMIN.

Kinds of Wheat

The wheat varieties grown today are far different from those first used for food by early peoples. If modern varieties were planted in the poorly prepared patches on which ancient man must have grown his crop, they would yield small returns. But the ancient varieties would be no more productive if they were planted in the well-prepared soils of the modern farm. Through the ages the weaker wheat strains have died out and those which were best suited to the area where they were grown have flourished.

During American colonial days the better farmers, including George Washington, observed that fields of wheat contained some plants that appeared better than the others. They improved their crops by saving the best plants for seed.

In the late 1800's the need for improved varieties of wheat was recognized when breeding programs were undertaken by the newly organized state agricultural experiment stations and the United States Department of Agriculture. Similar research has been undertaken in the Soviet Union and other wheat-growing countries.



Food Value of Wheat

Species. It is usually agreed that there are fifteen separate species of wheat. Some are primitive types and are not grown as food anywhere in the world. Others are raised in local areas where they grow especially well. Only seven species are widely grown on farms in this country. Only three species, common wheat (*Triticum vulgare*), durum wheat (*T. durum*), and club wheat (*T. compactum*), are of importance. Emmer (*T. dicoccum*), spelt (*T. spelta*), Polish wheat (*T. polonicum*), and poulard wheat (*T. turgidum*), are grown on a very small acreage. Probably about 30,000 varieties of wheat exist in the world. A survey made by the Department of Agriculture in 1939 indicated there were 183 kinds of common wheat, ten of durum wheat, and fifteen of club wheat grown in this country.

Some varieties have red grain, some have white, and a few found in Ethiopia have purple grains. The grain of some is hard, and of others, soft. The color of the chaff varies from white and red to black. Some wheat varieties have beards, and others have none. Many kinds are resistant to one or more diseases while others are not. Different varieties ripen at different times and are adapted for growing in different surroundings. Varieties are classified into two main groups—spring wheat and winter wheat.

Spring Wheat. Varieties of durum wheat and of common wheat with hard red grain are spring-planted in the northern sections of the Great Plains area of the United States and in the prairie provinces of Canada. *Thatcher*, the most important hard, red spring variety, is beardless, has white chaff and short, hard, red kernels which are of very fine quality for making bread. *Thatcher* is very resistant to stem rust. *Minidum*, the most important variety of durum, is bearded and has very hard, large yellow kernels which make excellent macaroni. These varieties are planted in the early spring and harvested in summer. If spring varieties are planted in the fall, they will not live through the winter except in the mildest climates or during unusually mild winters.

Winter Wheat is planted in the fall and is harvested during the following summer. If winter varieties are planted in the spring, they often will not head, or produce a crop, because winter wheat needs fairly low temperatures for proper development during early growth.

Winter varieties with hard red grains often are grown in the southern part of the Great Plains region. But these will not survive the severe winters farther north. This type is also grown in some of the dry-land sections in the Far West.

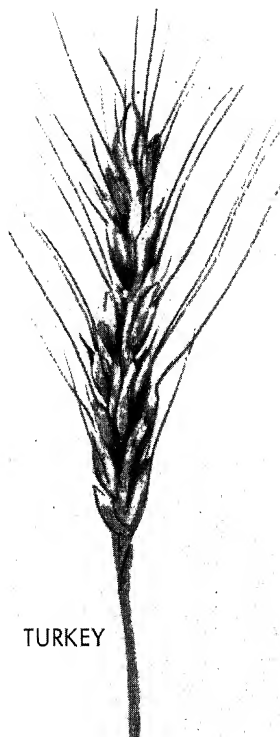
Most of the winter wheat varieties with hard red grain are of the bearded type. *Turkey*, an important variety, is bearded, has white chaff and medium-long slender red kernels, and makes good bread. The new disease-resistant varieties *Pawnee* and *Comanche* are rapidly replacing older varieties of hard red winter wheat.

Winter-wheat varieties with soft red grain are grown in the region extending from eastern Kansas and Oklahoma to the Atlantic Coast. Most of these are beardless. They yield flour that is especially suited for cakes, cookies, biscuits, crackers, piecrusts, and similar products. *Fultz* is one of the most extensively grown varieties of winter soft red grains.

Varieties of white wheat may be of the winter or



HYMAR



TURKEY

MINDUM

THATCHER

FULTZ

The Most Important Varieties of Wheat grown in the United States are *Turkey*, a hard red winter type introduced by Russian immigrants; *Mindum*, from which macaroni and similar

products are made; *Thatcher*, a red smut-resistant variety planted in the Great Plains area; *Hymar*, a winter wheat of the Pacific Coast states; and *Fultz*, a soft red winter variety.

U.S.D.A.

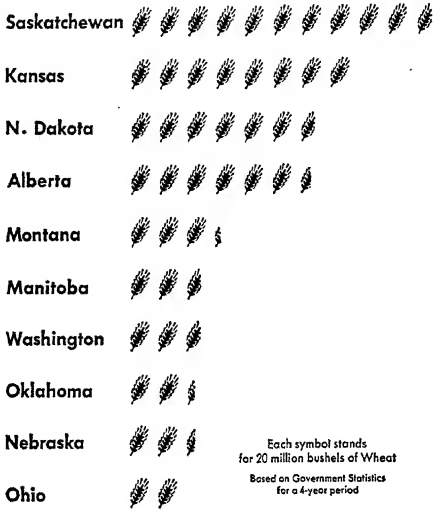
spring type and have hard or soft grain. Winter wheats with soft white grain are grown in New York and Michigan, in the East, and in the states west of the Rocky Mountains. *Yorkwin* is the variety of this class most extensively grown in the East. It is beardless, with soft white grain and white glumes. In the Pacific Coast states, *Baart*, a spring variety with beards, white glumes, and hard white kernels, is most widely grown. *Rex*, a beardless winter variety with soft white grain and red glumes is resistant to the stinking smut disease which in the past has caused heavy losses in this far western region.

Club wheats are grown only in the Pacific Coast states. *Hymar* and *Albit*, the leading varieties, are both winter wheats. They are resistant to stinking smut. They have very compact oval-shaped heads with soft white grain, white chaff, and no beards. Other club wheat may be spring wheats.

Leading Wheat Regions of the World

Wheat is adapted to a wider range of climatic conditions than any other crop, except, perhaps, barley. Wheat is grown in regions extending from the frozen tundras of the North to the southernmost tips of Africa,

Ten Leading Wheat States or Provinces



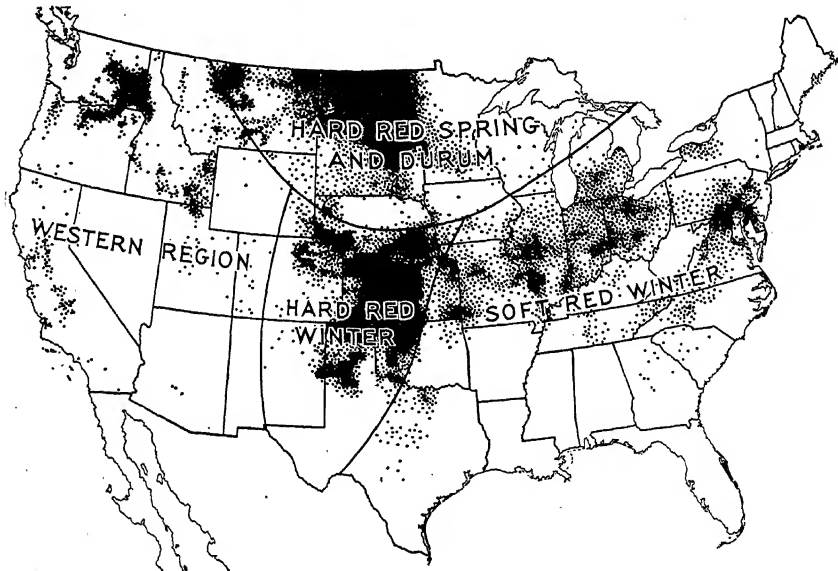
Tasmania, and New Zealand. It has been grown at Fort Yukon, Alaska (66°20' North latitude), just south of the Arctic Circle, and even within the Arctic Circle in parts of the U.S.S.R. It is grown at the equator on the high plateaus of Ecuador and Colombia, below sea level in the Imperial Valley of California, at about 8,000 feet above sea level in New Mexico, and at from 8,000 to 10,000 feet above sea level in Mexico, Afghanistan, and

other countries. It is also reported to have been grown at elevations as high as 14,000 feet in Tibet. It is raised in areas with as little as nine inches of annual rainfall and in other areas with as high as sixty-five or seventy inches.

The important wheat-growing regions are all in the Temperate Zones where the annual rainfall is between fifteen and thirty-five inches. Wheat is best adapted to loam and clay soils having plenty of humus, but does not grow well in sandy or peat soils. The U.S.S.R. and the United States are the leading world producers of wheat. The United States produces over one seventh of the world supply. Of this amount, Kansas produces more than one sixth. The United States, however, has about the lowest yield per acre of any country in the world. It would take a bin one mile square and about 250 feet high to hold the annual world production of around 5,737,000,000 bushels.

In North America there are three regions where wheat is the main crop and one other region where it is raised over scattered areas. In each of the three main regions the fields are large and can be cultivated by large machines pulled by tractors.

Spring-Wheat Region. The spring-wheat region of the northern Great Plains includes North Dakota, Montana, South Dakota, and Minnesota in the United States, and the provinces of Manitoba, Saskatchewan, and Alberta in Canada. The rainfall is light, especially over the western part, and this fact results in low yields in some years. Heavy losses have also been caused occasionally by stem rust, but the development of varieties resistant to this disease has greatly reduced damage from this source. In the drier sections it is a common practice to summer-fallow (plow the land in summer ready for the crop to be planted in spring) every other



Leading Wheat-producing Areas of the United States, Showing the Most Important Varieties Raised

year in order to accumulate an extra supply of moisture for the crop. The principal kind of wheat grown in this region is hard red spring wheat. It is often considered the best wheat in the world for bread. Enough durum wheat is also grown here to supply the United States and Canada with macaroni, spaghetti, and similar products.

Winter-Wheat Region. The hard red winter-wheat region is mostly in the southern Great Plains including Kansas, Oklahoma, Nebraska, Texas, eastern Colorado, and northeastern New Mexico. The winters are less severe, and fall-sown wheat can be grown successfully. The rainfall varies from about thirty-five inches in eastern Kansas and Nebraska to seventeen inches at the higher elevations of the western areas. This region, especially in the western part, often suffers severely from drought, and farmers must use tillage methods that conserve all the moisture possible for the growing crop. Scientists have found a close relationship between the amount of moisture stored in the soil in the fall when wheat is planted and yield obtained the following summer. Summer fallowing is a common practice. Grain

Wheat Production in the United States



AVERAGE PRODUCTION IN TWELVE LEADING STATES OVER A PERIOD OF TEN YEARS

STATE	BUSHELS
Kansas	126,060,000
North Dakota	75,820,000
Oklahoma	48,419,000
Washington	48,198,000
Montana	42,550,000
Ohio	42,003,000
Nebraska	41,085,000
Illinois	34,580,000
Texas	28,195,000
Indiana	28,154,000
Missouri	26,875,000
Idaho	24,194,000

Wheat Production in Canada

PROVINCE	BUSHELS
Saskatchewan	156,290,000
Alberta	117,367,000
Manitoba	36,082,000

Ten Leading Wheat Countries

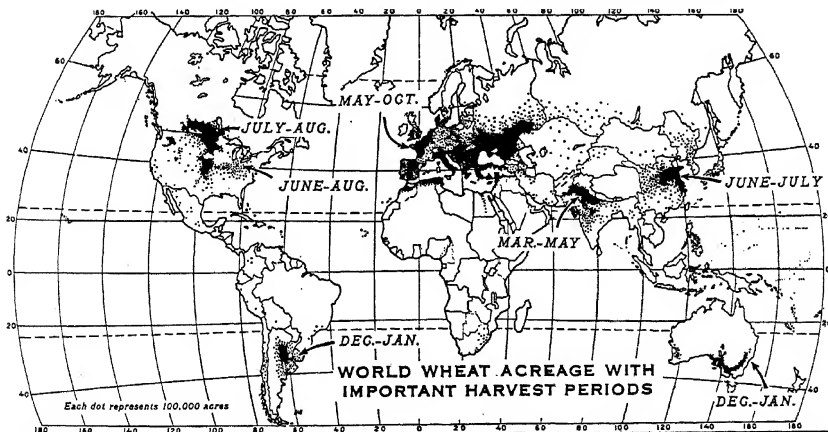
Soviet Union	
United States	
China	
India	
Canada	
France	
Italy	
Argentina	
Germany	
Australia	

Each symbol stands for 100 million bushels of Wheat
Based on Government Statistics for a 4-year period

PICTOGRAPH CORPORATION

from this region is highly prized for making bread, and some authorities consider it fully equal to that made from the hard red spring class.

The Columbia River Basin. The third region in North America where wheat is the major crop is the Columbia Basin in the Pacific Northwest. This region varies from gently to steeply rolling land with deep fertile soils that hold water well. The rainfall varies from nine inches in the drier sections to twenty-five inches near the foothills of the Blue Mountains in eastern Oregon and Washington. Most of the rain falls during the winter months. By



Leading Wheat-producing Areas of the World, Showing the Harvest Periods

summer following, the soil accumulates plant food, especially nitrogen, for the following crop. Summer fallowing is practiced more widely in this region than anywhere else in the United States. Both winter and spring varieties of wheat are grown. Some have white and some red grains, and the texture varies from soft to hard. The soft varieties are used for making cakes, biscuits, crackers, and pastries, while those with hard grain are used for bread flour.

East of the Mississippi. Wheat is not the major crop east of the Mississippi River, but a large acreage is grown in rotation with other crops in Ohio, Illinois, and Indiana. Varieties with soft grain suitable for making cakes, crackers, cookies, and pastries grow well in this region which has an annual rainfall ranging from thirty to forty-five inches.

Union of Soviet Socialist Republics. The largest wheat-producing region in the world is the *chernozem*, or black soil, belt of southern Soviet Russia, which extends from the Ural Mountains on the northeast into the Danubian Basin on the southwest, a distance of over 1,500 miles. It is a level prairie with deep fertile soil. The climate is similar to that of the Great Plains of North America, but is colder in winter, and the annual rainfall is somewhat less. Wheat has been grown here

for many hundreds of years. Hardy, drought-resistant varieties have been developed because of the severe climate.

South America. The principal wheat-producing region in South America is the fertile level prairie extending from the Atlantic Ocean to the foot-

hills of the Andes in central Argentina. The climate is mild and wheat seldom winterkills, but late spring frosts after the wheat is headed sometimes cause damage. Rainfall varies from forty inches in the north to eighteen inches in the south and west. In this region large grain farms are scattered among cattle ranches.

World Wheat Production

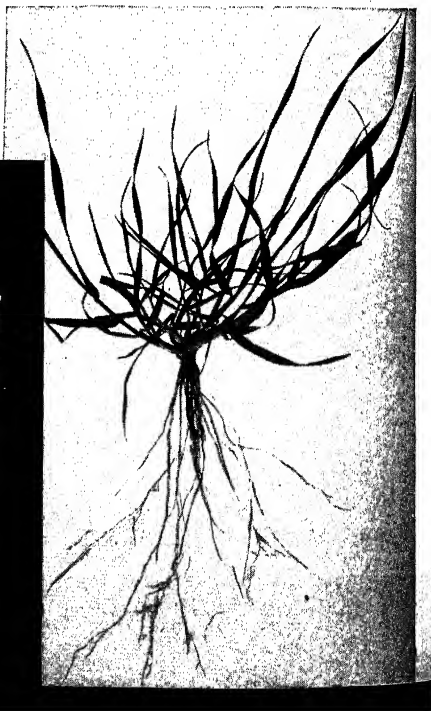
AVERAGE PRODUCTION IN TWELVE LEADING COUNTRIES
OVER A PERIOD OF TEN YEARS

COUNTRY	BUSHEL
U.S.S.R.	857,700,000
China	768,080,000
United States	746,433,000
India	363,074,000
Canada	330,479,000
France	295,754,000
Italy	266,061,000
Argentina	230,494,000
Spain	224,533,000
Australia	177,737,000
Germany	174,422,000
Rumania	122,131,000
Total	4,556,898,000

Other Wheat-producing Regions. Southeastern Australia, northwestern India, and northeastern China are also important wheat-producing areas. More than one billion bushels are grown there, although wheat is not a major crop. The Danubian countries also are important producers of wheat. Australian wheat has a large place in international trade, partly because a large proportion of the crop is exported, and also because it is harvested and reaches world markets when supplies in other countries are lowest. Statistics of wheat production in China are very incomplete, but the estimates indicate that this country grows about as much wheat as

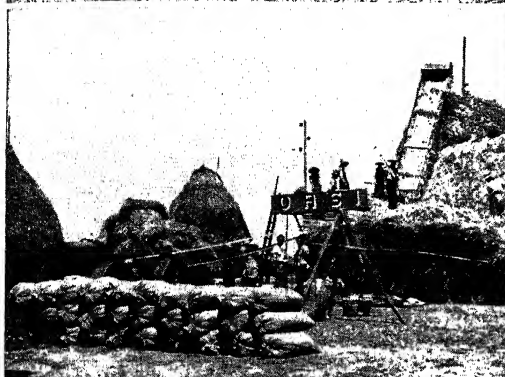
The Wheat Plant. At the left is the spring wheat seedling. It grows tall and has short roots. At the right is the long-rooted, bushy, winter wheat seedling. Below is an enlarged photograph of the tiny flowers that blossom before the grains of wheat begin to form.

U.S.D.A.



WHEAT FARMING IN OTHER LANDS

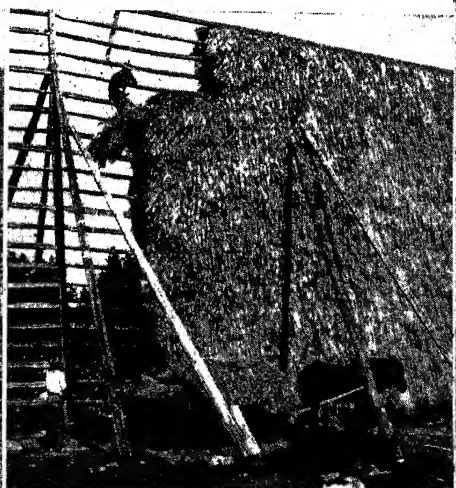
Below: Farmers on the high plains of Peru make a cross out of wheat ears and the grain is blessed by the priest.
Right: In Hungary, women help the men with the harvesting.
 Photos: James Sawders



Second left: A threshing scene in Italy. The once plague-ridden Pontine marshes have been drained and cultivated to yield wheat. *Second right:* A native of India winnowing threshed grain by letting the wind blow away the chaff.

Lower left: Many farmers in Peru and other countries still use crude methods of threshing wheat with flails. *Lower right:* Because of the damp climate, Swedish farmers often have to dry the harvested wheat on such racks as this.

Photos: James Sawders



does the United States and is a leading wheat area.

The Enemies of Wheat

Wheat is subject to many diseases, most of which (such as the rusts and smuts) are caused by very small plants called fungi. These fungi do not contain chlorophyll and therefore cannot make their own food. They must obtain their food from the wheat plants in which they live as parasites. The life histories, as well as the effects and control of these parasites, differ.

Rust is among the most destructive of wheat diseases. It produces small orange or rust-colored spots on leaves, stems, and heads of wheat. These spots later turn black. They are really masses of spores ready to infect other wheat plants and spread the disease. As the spores are carried by the wind from field to field and sometimes for hundreds of miles, treating the seed will not control rust. The only remedy is resistant varieties. There are two important kinds of rust: *stem rust* and *leaf rust*. Stem rust is more destructive and in some years causes very heavy losses, particularly in the northern Great Plains area. It attacks the stems and leaves of the plants at any time after they are headed, stops the flow of food and water to the kernels, and causes them to shrivel. It is estimated that in 1935 it reduced the production of wheat in North Dakota alone 59,000,000 bushels. Leaf rust usually attacks only the leaves. It reduces the amount of food that is manufactured and, therefore, the number and size of kernels.

Smut. Another destructive disease that attacks wheat is smut, of which there are two principal kinds in this country: *covered smut*, commonly called bunt or stinking smut, and *loose smut*. When a wheat plant is infected with bunt, the inside of the kernel is replaced by the black spores or seeds of the smut. If these spores are on wheat kernels when they are planted, they germinate at the same time as the wheat. The small smut plant then enters the wheat seedling and grows up inside the plant. The kernels filled with the black spores are known as smut balls and have a characteristic foul or fishy odor. They may be broken during the threshing and millions of spores may be scattered over the healthy kernels, and so infect the next crop. The organisms that cause diseases have larger families than such crop plants as wheat. An average wheat plant produces only about fifty kernels, while an average smut plant probably produces 150,000,000 spores. This disease can be controlled by seed treatment or by growing resistant varieties.

Wheat plants infected with loose smut have the kernels and chaff replaced with black spores, leaving only the central stem of the head. The spores are carried by the wind to other plants. The parasite enters the kernel as it starts to form, and lives unseen inside until it is planted. Then it grows inside the kernel. Treating with a dust preparation will not control loose smut. However, it can be killed by putting the grain in water held at a temperature of exactly 129° Fahrenheit for a definite period of time. A slightly higher temperature will kill the wheat, and a lower one will not kill the smut. Therefore, treatment is difficult and is not often practiced. Some varieties of wheat are resistant, and when they are grown losses are small.

There are several other wheat diseases caused by

fungi, including scab, take-all, flag smut, leaf spot, and glume blotch, but these do not often cause widespread damage. Black chaff, a disease caused by bacteria, and mosaic, a disease caused by a virus, are of minor importance.

Wheat to be used for seed should be run through a fanning mill to remove all foreign material such as weed seeds, smut balls, and broken or small kernels. Where stinking smut prevails, seed should also be treated with a recognized dust preparation such as copper carbonate to kill the smut.

Insect Enemies. Wheat also has insect enemies. Of these the Hessian fly causes the greatest losses. This fly is about the size of a mosquito. It lays eggs on the leaves of wheat plants. The larvae which hatch crawl down between the leaf sheath and stem, where they feed on the plant juices. Small stems may be killed outright, while older stems are so weakened that they break before harvest. Seeding winter wheat after the fall brood of flies has hatched avoids heavy damage. Much progress has been made in breeding adapted varieties of wheat resistant to Hessian fly attack. During periods of dry weather, grasshoppers often cause severe damage in some areas. They can be controlled by spreading poisoned bran in the fields.

Other insect enemies of less importance are wheat jointworms, sawflies, chinch bugs, army worms, wireworms, and green bugs.

Breeding Disease-resistant Wheats. Crossbreeding two varieties and selecting descendants combining the good points of both parents has been especially useful in developing wheats resistant to diseases such as rusts and smuts. By this method, plant breeders of the Minnesota Agricultural Experiment Station and the Federal Bureau of Plant Industry produced *Thatcher*, a variety which has added millions of dollars to the income of farmers in the northern Great Plains and Prairie Provinces of Canada. The story of *Thatcher* is almost unbelievable. It was first distributed to a few farmers in 1934, but it proved so popular and increased so rapidly that by 1940 it was grown on 17,000,000 acres in the United States and Canada. Farmers who had seen the stem rust cause such large losses in 1904, 1916, and 1927, and smaller losses in other years, saw fields of wheat destroyed by rust in 1935, while those planted with *Thatcher* wheat suffered practically no damage in comparison.

The development of *Thatcher* required a period of fifteen years, for out of the thousands of plants grown from the hybrid only a few were resistant to rust. Of these, some had weak straw, low yield, or other undesirable plant characters and were discarded. Even after the high-yielding, desirable plant types were chosen, the job was not finished, for the hard red spring wheats were known the world over for the quality of bread that could be made from them and the new wheat also must uphold this reputation. The plant breeders of the state agricultural experiment stations and the Federal Bureau of Plant Industry have also developed wheat varieties that are resistant to leaf rust, stinking smut, loose smut, severe winter conditions, drought, and even to insects such as the Hessian fly. Several are already being grown by farmers in different sections of the country.



HEALTHY GRAIN



INFECTED GRAIN

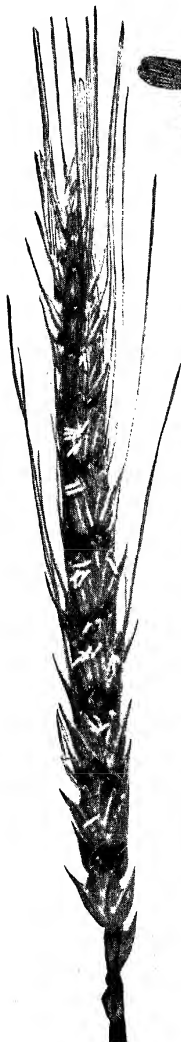


MASS OF SMUT SPORES

ENEMIES OF WHEAT



Since the days of ancient Egypt, the grasshopper, or locust, *above*, has troubled the farmer. In drought years, clouds of grasshoppers settle on wheatfields and devour the plants. Stubble, *right*, is often all that remains of a wheat crop after hailstones have beaten down or broken off the ears.



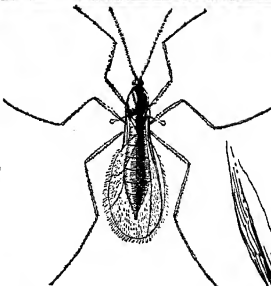
HEALTHY



DISEASED



CHINCH BUG
(enlarged)

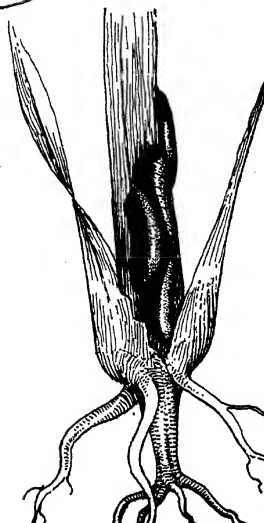


ADULT HESSIAN FLY
(enlarged)

PUPA OF HESSIAN FLY
(enlarged)

A healthy ear of wheat, *first left*, is firm and well developed, but becomes stunted, *second left*, when infected with loose smut and ends up, finally, in a dusty mass of smut spores. One of the worst enemies of wheat is the chinch bug, *above left*, which when hatched in the early spring feeds on the young wheat. Dry seasons are especially favorable for these pests. The Hessian fly, *above right*, is tiny and brown in color. The female lays her eggs on the leaves or lower joints of the plant. Embedded between leaf and stem, the young maggots suck the juice from the plant, retard its growth, and finally destroy it. The tiny pupa of the Hessian fly, *lower right*, looks something like flaxseed. The insect exists in this state for several weeks.

Photos: U.S.D.A.



Solving Problems of the Wheat Farmer

Price. The world price of wheat is largely determined by the available supply. After World War I, however, barriers to international trade caused the local price in many countries to be above the world price. During the war, production in many European countries was greatly reduced, while wheat farmers in the United States, Canada, Argentina, and Australia, under patriotic and economic urging, greatly increased their acreage.

At the end of the war, European nations increased their production even above what it had been before the war, so they would not have to depend so much on imports. The world supply of wheat increased and prices declined. In importing countries, prices were kept up by means of tariffs, but prices fell so low in exporting countries that farmers were receiving less for wheat than it cost to produce it. The resulting distress of wheat farmers and other agricultural producers was one of the causes of the world-wide depression of the early 1930's. Most of the nations of the world then found it necessary to adopt measures to help the wheat farmer and protect the consumer at the same time.

Federal Farm Board. The Federal Farm Board was established by Congress in 1929. It tried to help the wheat farmer by encouraging co-operative marketing, but the growing surplus continued to keep prices down.

Agricultural Adjustment Act. In 1933 the Agricultural Adjustment Act attacked overproduction and low income through co-operative acreage reduction and benefit payments. Farmers who did their share toward reducing overproduction, received direct payment from the Government in addition to what they received for wheat in the market.

Before the acreage-reduction program could prove its effectiveness, severe droughts in 1934 and 1936, and rust in 1935 and 1937, struck the wheat regions and wiped out the surplus. Provisions of the Agricultural Adjustment Act were changed in 1936 and 1938.

Ever-Normal Granary. The Ever-Normal Granary plan is a modern application of a plan used by Joseph in Egypt more than three thousand years ago, and by the followers of Confucius about one thousand years later in China. It provided measures to protect both farmer and consumer from crop failures and burdensome surpluses. The program gives the farmer greater freedom in marketing. Instead of being forced to sell all his wheat at harvest as he formerly had to do, he has the option of storing it under government loan. During the years just before World War II the surplus of wheat in the United States and other wheat-growing countries greatly increased. During the war period, farmers of the United States were again urged to increase production of wheat. The increased production along with the accumulated stocks were very effectively used as food for the United States and its Allies. It was also used as feed to greatly increase the production of pork and beef, and for the production of alcohol for the manufacture of munitions and rubber. At the end of the war, large quantities of wheat were shipped to starving nations abroad.

B.B.B.

Related Subjects. The reader is also referred to:

Agriculture
Army Worm

Brán

Bread
Chemurgy
Chinch Bug
Combine
Co-operative
Dry Farming
Farming and Farm Life
(color plate, Harvesting
Wheat)
Flour

Gluten
Grain Elevator
Grain Weevil
Hessian Fly
Rust
Starch
United States of America
(color plate, Farm
Scenes)

Questions

What is the only grain that is used more for food than wheat is?

Where did wheat first come from? What early peoples raised it?

Who first brought wheat to the Americas? When?

In what part of the world is wheat harvested in June? In December?

What was the first important machine to be used for wheat harvests? Who invented it? When?

What is a combine? In what parts of the country are combines used?

In what way did the invention of large farm machinery affect the course of the War between the States?

How much wheat does the average person in the United States eat during a year?

What are the chief foods in wheat kernels?

What are the seven chief varieties of wheat grown in the United States? Which three are most important?

How far north has wheat been grown? What is the highest altitude at which wheat has been grown?

What are the four leading states in wheat production in the United States?

Where is the largest wheat-producing region in the world? Why does wheat grow so well there?

WHEAT GRASS. See GRASS (Couch Grass).

WHEATLEY, PHILLIS (1753?-1784), was a Negro slave who became a well-known poet. She was born in Africa and was brought to Boston when she was about eight years old. John Wheatley, a tailor, bought her as a maid for his wife. The Wheatleys were very kind to her and taught her to read. She began to write poems when she was about thirteen. Most of them were little better than imitations of the works of popular English poets of the time. But they were widely read because of the circumstances of her life. After the Wheatleys died, she was freed, but she soon died after difficult attempts to make a living. C.H.T.

WHEATON, HENRY. See RHODE ISLAND (Famous Rhode Islanders).

WHEATON COLLEGE is a privately controlled, coeducational school at Wheaton, Ill. The college has a strong Christian emphasis, and is supported by individuals and churches of many denominations. It has schools of liberal arts and sciences, theology, and music. The college was founded in 1860, and has an average enrollment of about 1,200. E.F.R.

WHEATON COLLEGE is a privately controlled, liberal arts school for women at Norton, Mass. It was founded as Wheaton Female Seminary in 1834 and became a college in 1912. Courses lead to the B.A. degree. Average enrollment is about 475. A.H.Mr.

WHEATSTONE, CHARLES, SIR (1802-1875), was an English physicist and inventor. He is best known for his work in the field of the telegraph. Wheatstone was born in Gloucester, and became a maker of musical instruments in London. His scientific papers attracted atten-

tion, and in 1834 he was made professor of experimental philosophy at King's College, London.

Wheatstone's early experiments were in testing the speed of electricity. He found its speed so great that he thought it would be useful in sending messages. In 1837, with W. F. Cooke, he secured a patent on an electric telegraph. Samuel Morse's telegraph was operated before Wheatstone's, but Wheatstone's invention was widely used in the early British telegraph system.

His other inventions included a concertina, a cryptographic machine, the kaleidophon, the stereoscope, the polar clock, the "A,B,C" telegraph instrument, and in 1868 the automatic telegraph. R.K.M.

See also CONCERTINA; TELEGRAPH (History).

WHEATSTONE BRIDGE. This device is used for measuring the electrical resistance of a conductor. A Wheatstone bridge consists of two resistances known as the bridge arms. The resistances of these bridge arms are known. The bridge also has a third resistance which is adjustable so that the resistance can be changed. These three conductors are connected in a circuit with the unknown resistor that is to be measured. A battery and a galvanometer are also connected in the circuit. The adjustable resistor is then varied until the galvanometer shows no flow of current in the circuit. At this point the bridge is said to be balanced. The value of the unknown resistor can then be computed by knowing the ratio of the bridge arms, and the value of the ad-

justable resistor. This is computed by the formula, $\frac{R_1}{R_2} = \frac{R_3}{R_4}$, where R_1 is the unknown resistor, R_2 is the

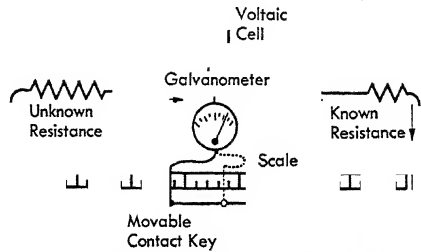


Diagram of Operation of the Wheatstone Bridge

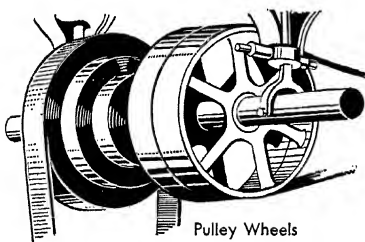
adjustable resistor, R_3 and R_4 are the bridge arms. To further simplify, R_1 is then equal to $\frac{R_3 R_2}{R_4}$.

The most common type of Wheatstone bridge is made of tapped spools of special resistance wire. The taps are brought out to switches which include whatever part of the resistance necessary to produce a "balance" in the bridge. P.H.C.

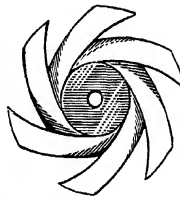
See also GALVANOMETER.

WHEEL. The discovery of the wheel marked one of the most important steps in man's development. The first important use of the wheel was in transportation. Wheeled chariots and carts were easier to pull and moved more rapidly than sledges. They also permitted

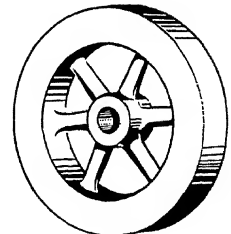
SOME USES OF THE WHEEL



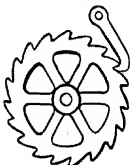
Pulley Wheels



Fan Wheel



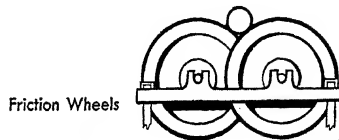
Flywheel



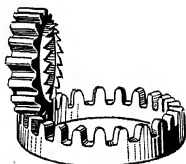
Ratchet Wheel



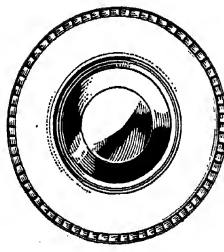
Cog-Wheel



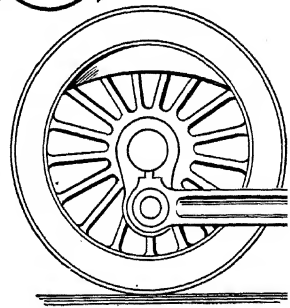
Friction Wheels



Crown Wheel

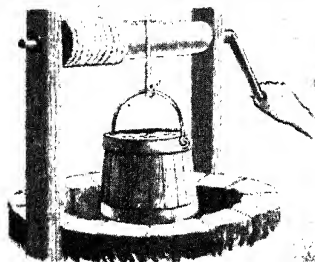


Automobile Wheel

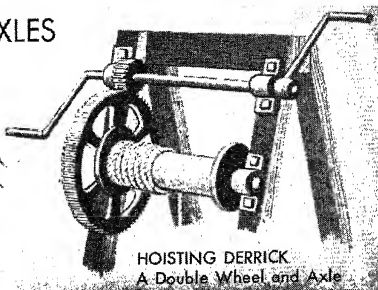


Drive Wheel

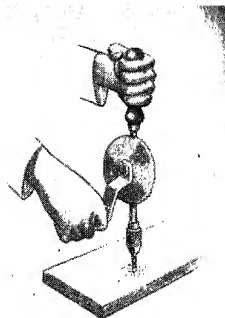
SOME WHEELS AND AXLES



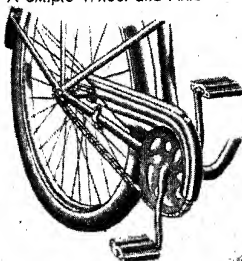
THE WINDLASS
A Simple Wheel and Axle



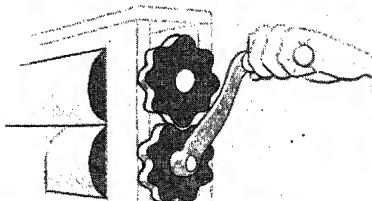
HOISTING DERRICK
A Double Wheel and Axle



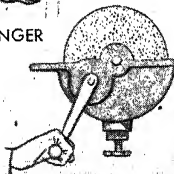
HAND DRILL



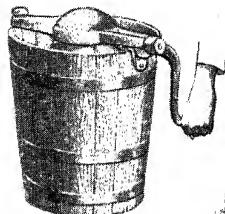
BICYCLE
Pedal and Sprocket Wheel



CLOTHES WRINGER



GRINDING WHEEL



ICE CREAM FREEZER

man to make better use of the work of horses and other animals. The wheel has found another important use in mechanics, in the form of gears, flywheels, and driving wheels for controlling the flow of power. Without the wheel, civilization as we know it would be impossible.

"Breaking on the wheel" was a form of torture used for thousands of years. The limbs of the condemned man were stretched on the side of a large wheel. The limbs were then broken, and the victim might be left to die. Breaking on the wheel was not completely abolished in Europe until the beginning of the 1800's.

See also TRANSPORTATION (illustration, The Wheel).

WHEEL AND AXLE. *AK s'l*, is a mechanical device used in lifting loads. The simplest wheel and axle has a cylinder and a large wheel, fastened together and turning on the same axis. Sometimes a crank is used instead of a wheel. The wheel and axle is a form of the lever. The center of the axle (the cylinder) corresponds to the fulcrum. The radius of the axle corresponds to the load arm. The radius of the wheel corresponds to the force, or effort, arm to which force is applied.

The wheel and axle does much work for us with but little effort on our part. The following law gives the ratio between the two: *The force applied multiplied by the radius of the wheel equals the load multiplied by the radius of the axle.* To reduce this to a formula, we shall let F stand for force, R for the radius of the wheel, L for the load, and r for the radius of the axle.

$$FXR = LXr, \text{ or } \frac{L}{F} = \frac{R}{r}$$

Force and load would normally be the same. Therefore, the mechanical advantage is equal to the radius of the

wheel divided by the radius of the axle, or $\frac{R}{r}$. Let us use

an example in which the radius of the wheel (R) is 10 inches, the radius of the axle (r) is 1 inch, and the load is 20 pounds. If there were no friction the formula would be $\frac{20}{1} = \frac{10}{1}$. The force needed would be the same as that used normally to lift a mere 2 pounds. The mechanical advantage would be $\frac{20}{2}$, or 10.

Common Uses of the Wheel and Axle are shown in the accompanying illustration. The ordinary windlass for raising water from a well is shown at the upper left. The wheel is here replaced by a crank. The hand applies the effort to the crank and the weight of the bucket of water is the load.

In a clothes wringer, the handle is the radius of the force arm; the radius of the roller is the load arm. In a grindstone, the radius of the wheel is usually longer than the crank handle, because speed is needed as well as force. Sometimes teeth, or cogs may be placed around the edge of the wheel, as in a cogwheel, or in the hand drill, or the sprocket wheel on a bicycle. Sometimes the force is applied in the direction of the crank. R.F.P.

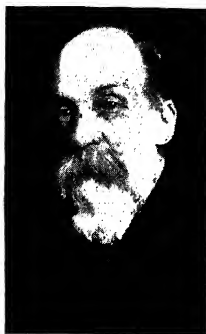
See also RATCHET; WINDLASS.

WHEELBARROW. A wheelbarrow is a device for moving loads heavier than a man can lift. It consists of a tub or box mounted on a wheel with two handles extending under the body and joining on the axle of the wheel. The wheelbarrow is an application of the principle of the lever, and is the kind known as a second-class lever. The load carried by the wheelbarrow is lightened according to the length of the handles. Modern wheelbarrows may be made of wood or of light metals such as aluminum. Rubber tires make them

easier to push. See also LEVER; TRANSPORTATION (illustration, Unusual Conveyances).

WHEELER, BURTON KENDALL (1882-). See PROGRESSIVE PARTY.

WHEELER, JOSEPH (1836-1906), was an American soldier. He was born in Augusta, Ga., and was graduated from the United States Military Academy in 1859. Wheeler served in campaigns against the Indians before joining the Confederate Army in 1861. During the War between the States he made a brilliant record as a cavalry general at the battle of Shiloh and in campaigns in Tennessee and Georgia. After the war Wheeler practiced law in Alabama, and from 1881 to 1900 was a member of the United States House of Representatives. During the Spanish-American War he commanded American forces at the battles of Las Guasimas and San Juan. See also STATUARY HALL. H.J.E.



Joseph Wheeler, noted Confederate soldier

WHEELER, SCHUYLER SKAATS (1860-1923). See ELECTRIC FAN.

WHEELER, WILLIAM ALMON (1819-1887), was Vice-President of the United States from 1877 to 1881. He was born in Malone, N.Y., and began his career in national politics in 1860, when he was elected to Congress.

WHEELER, WILLIAM MORTON (1865-1937), was an American zoologist. He made a lifelong study of ants and wrote a number of books on their manner of living. Wheeler studied fossilized ants and proved that ants had not changed structurally in many millions of years. He was born in Milwaukee, Wis., and was educated at the German-American Normal College there. For a while afterward, Wheeler taught at the universities of Chicago and Texas. In 1908 he became professor of economic entomology at Harvard University. B.J.

His works include *Ants, Their Structure, Development, and Behavior* and *Demons of the Dust, a Study in Insect Behavior*.

WHEELER DAM. See ALABAMA (Conservation).

WHEELER-LEA ACT OF 1938. See CONSUMER EDUCATION (Government Activities).

WHEELER NATIONAL MONUMENT. See NATIONAL MONUMENT.

WHEELING, W.Va. (population 61,099), is an industrial center on the east bank of the Ohio River. It is about sixty-five miles southwest of Pittsburgh, Pa. Wheeling Island, a mile-long island in the river on which the West Virginia State Fairgrounds are situated, lies within the boundaries of the city. Several bridges connect the rest of the city with the island and with the Ohio cities of Bellaire, Bridgeport, and Martins Ferry.

Wheeling has a municipal market and auditorium in the heart of the business district. There are several parks and playgrounds. A public recreation area just outside

the outskirts of the city covers 750 acres. Wheeling is the home of Linsly Military Institute, which is a preparatory school for boys, and Mount de Chantal Academy (for girls). West Liberty State College and Bethany College are near by.

Industry and Trade. Wheeling is well supplied with coal from the West Virginia fields near by, and with natural gas and electric power. There are more than 200 manufacturing plants in the city. The principal manufactures are iron, steel, tin plate, patent medicines, tobacco products, china and porcelain, aluminum and glass, tiles, nails, and furniture and other wood products. Since 1840 Wheeling has been noted for the production of hand-rolled cigars called *stogies*.

History. Wheeling was founded in 1759 by Colonel Ebenezer Zane and his two brothers, who came from the South Branch of the Potomac Valley of Virginia. The town grew up around Fort Henry. In 1782, the fort was under attack by Indians. It is said that Betty Zane, an eighteen-year-old sister of Colonel Zane, saved the defenders by rushing through gunfire to bring a keg of powder from a log cabin some distance from the fort.

The town was laid out in 1793, incorporated in 1806, and first chartered as a city in 1836. For many years Wheeling was the western end of the National Road. It was the first town on the Ohio River to be reached by a railroad, and was the western end of the Baltimore & Ohio Railroad tracks for many years afterward. Wheeling was the headquarters for Virginians who opposed secession from the Union before the War between the States. Wheeling was the capital of the new state of West Virginia from 1863 to 1870, and again from 1875 to 1885. Wheeling has the city-manager form of government. R.B.Co.

WHEELLOCK, ELEAZAR. See DARTMOUTH COLLEGE; NEW HAMPSHIRE (Famous Men and Women).

WHEEL OF LIFE. See MOTION PICTURE (History of the Motion Picture).

WHEEL WINDOW, another name for ROSE WINDOW. See WINDOW.

WHEELWRIGHT, WILLIAM (1798-1873), did much to develop the commercial possibilities of South America. He was born at Newburyport, Mass., and attended Phillips Academy. In 1814 he became a sailor and settled in South America after his ship went aground near Buenos Aires. He was United States Consul at Guayaquil, Ecuador, and then developed business enterprises in Valparaiso, Chile. In 1840 he founded a steamship company to operate along the west coast of South America, and between 1849 and 1852 he built the first railway in South America. It ran from Caldera, Chile, to the mining town of Copiapó.

In 1850 Wheelwright started the first telegraph line in South America. Soon afterward he began to work on his dream of a railway to cross the Andes Mountains from the Argentine coast to the coast of Chile. He accomplished part of this task, but political and financial difficulties held up the completion of the project until 1910. Wheelwright's last important work was the development of the port of La Plata, near Buenos Aires, Argentina. H.U.F.

WHELK. The whelk is a snail that lives in the ocean along the North Atlantic coasts of Europe and North

America. It has a spiral shell and grows to be about three inches long. See also CRUSTACEAN. W.J.G.

Classification. The whelk is classed as *Buccinum* in the order *Stenoglossa* in the subclass *Prosobranchia*.

WHETSTONE. See ARKANSAS (Minerals).

WHEY, *hway*. See CHEESE (How Cheese Is Made).

WHIDBEY, HWID bih, ISLAND. See WASHINGTON (Location, Size, and Surface Features).

WHIG. The Whigs were members of a political party which played an important part in early United States history. The party took shape about 1834, and was active for more than twenty years. The members of various groups in early England and Scotland, and in the American colonies were also called Whigs. The name *Whig* is a shortened form of the word *whiggamore*, which was a term once used in Scotland to describe a driver of horses. In the late 1600's, Scottish and English opponents of the growing power of royalty were called Whigs.

In the American colonies the Whigs were those persons who resented British control in the New World, and who favored independence from Great Britain. The term was probably first used in New York City about 1768. The Whigs supported the American Revolution, and were opposed by British loyalists known as *Tories*.

After the United States won its independence from Great Britain, the terms Whig and Tory were not commonly used for many years. About 1832 the political groups and personalities which opposed Andrew Jackson and his theories began to combine and unify themselves into a political party. The groups included the National Republicans, certain conservative factions of the Democratic party (the earlier Democratic Republican party), and what was left of the former Anti-Masonic party. The political personalities included such well-known National Republicans as Henry Clay, John Quincy Adams, and Daniel Webster. As the National Republican party, these groups and political leaders united to advocate new and broader activities for the national government. When Jackson and his Democrats came out against the United States Bank, Clay and his followers immediately supported the institution. Clay opposed Jackson in the Presidential election of 1832 but was defeated. As time went on, the groups opposed to Jackson came to be known as the Whigs. The Whigs cried out against the "tyranny" of Jackson, and took up and defended the rights of the states.

In 1836 the Whig party nominated William Henry Harrison, Hugh White, and Daniel Webster. But the Democrats won the election easily with their candidate, Martin Van Buren. In 1840 Harrison was the sole presidential candidate for the Whigs. He won the election, but died after serving only one month in office. Vice-President Tyler followed Harrison as President. Tyler had been nominated as Harrison's running mate chiefly to catch Southern votes. Actually, Tyler was not a Whig and was opposed to the Whig program. As President, his opposition weakened somewhat the strength of the party which had elected him.

In 1844 the Whigs once again nominated Henry Clay for the Presidency, but he was again defeated, this time by the Democrat, James K. Polk. One reason for his defeat was his refusal to take a position on slavery,

which cost him many Northern Whig votes. But in the election of 1844, for the first time, the Whigs presented a real political program. This program included a high tariff, regulated currency, a single term for the Presidency, and a public works project.

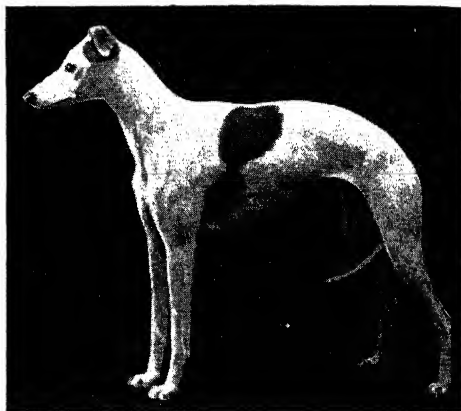
In 1848 the Whigs managed to win the Presidency with the popular Zachary Taylor. Four years later the Whigs tried to repeat the victory with General Winfield Scott. But Scott was defeated by the Democratic candidate, Franklin Pierce. The Whig party had already started to break into sectional groups over the question of slavery.

The Kansas-Nebraska Bill of 1854 split the Whig party still further. Most of the Northern Whigs joined the new Republican party. Many of the Southern Whigs returned to the Democratic party. In 1856 a Whig convention backed Millard Fillmore, the unsuccessful Know-Nothing candidate for President. By 1860 the few remaining Whigs had become part of the Constitutional Union party. After that, all traces of the Whig party disappeared. G.E.M.

See also CONSTITUTIONAL UNION PARTY; KANSAS-NEBRASKA BILL.

WHIN, *hwin*. See FURZE.

WHIPPET. The whippet is a lean, muscular dog that looks like a small greyhound. It was bred from the Italian greyhound and the terrier. A whippet weighs about 20 pounds and stands about 18 inches high. It



Percy T. Jones

The Lean and Racy Lines of the Whippet indicate the dog's swiftness. Whippets have run 200 yards in 12 seconds.

may be black, red, white, fawn, or brindle. It has a narrow pointed head, muscular neck, long back, and long, tapering tail. Whippets are used for hunting rabbits and racing. See also RACING. S.E.M., Jr.

WHIPPING POST is a post to which persons are tied when they are punished by being beaten. Such beatings formerly took place in public. Most villages in England and the American colonies had whipping posts in their public squares. These posts were often set up with another device for public punishment called the stocks. See STOCKS.

People are seldom sentenced to be whipped in modern times. The prison sentence has taken the place of

physical punishment in most civilized countries. But many countries still have laws which permit such sentences to be passed. In England, robbers may still be whipped with the cat-o'-nine-tails, a whip made of nine lengths of knotted cord. Wife beaters may be whipped in the state of Delaware. Youthful lawbreakers in England and Scotland are often punished by whipping. Flogging, or whipping, is frequently used as a means of punishing convicts in prisons.

A.E.W.

See also **COLONIAL LIFE IN AMERICA** (illustration, Punishing Wrongdoers).

WHIPPLE, HENRY BENJAMIN. See **MINNESOTA** (Famous Minnesotans).

WHIPPLE'S COMET. See **COMET**.

WHIPPOORWILL. This North American bird belongs to the goatsucker family. It has a wide mouth rimmed with long bristles. Its spotted brown feathers are so soft that it flies silently through the air. It was given its name because of its odd, whistling cry of "whip-poor-will, whip-poor-will."

The whippoorwill is about ten inches long. It lives in thick woods and eats a great number of large-bodied beetles and moths. At dusk it comes to the edge of the woods but not to the cities, as does its close relative the night-hawk. It flies about mostly at night. It rests by day on the ground or perches lengthwise on a log. Its mottled feathers make it hard to see.

The whippoorwill lives in the Eastern and South-eastern States northward to the southern part of the eastern provinces of Canada. It spends the winter in Central America. The whippoorwill makes no nest, but the female lays its two eggs among the leaves on the ground. The eggs are white, delicately marked with lilac and brown. Farmers like the whippoorwill and its relatives, the *chuck-will's-widow* and the *poorwill*, because they eat harmful insects.

A.A.A.

See also **BIRD** (color plate, Birds Whose Color Protects Them).

Classification. The whippoorwill belongs to the family *Caprimulgidae*. Its scientific name is *Antrorostomus vociferus*.

WHIRLIGIG, WHIRL *ih gig*. See **WATER BEETLE**.

WHIRLPOOL. A mass of water which spins around and around very rapidly and with great force is called a whirlpool. A whirlpool may form in water for several reasons. It may occur when the water current strikes against a bank which has a peculiar form. It may also occur when opposing currents meet, and it may be

caused by the action of the wind. Rocks or tides which get in the way of the water current often form whirlpools in the ocean.

There are several well-known and dangerous whirlpools. One of these is the whirlpool in the gorge below the falls of the Niagara River. This whirlpool was caused by the wearing away of a side basin out of the line of

the river's course. The Maelstrom, which is off the coast of Norway, is formed by rocks and tides which oppose the current. The Charybdis, between Sicily and Italy, is formed by winds which act against the tidal currents. In calm weather, these whirlpools are not dangerous to ships. During storms, however, the whirlpools become violent and dangerous. E.D.W.

See also **MAELSTROM; NIAGARA FALLS** (Whirlpool).

WHIRLWIND. A whirlwind is a circular or spiral movement in the air, caused by the sudden rising of an overheated layer of air near the ground. Whirlwinds occur most frequently in the deserts, where the sun beats down on the dry sand, heating the air near the ground to a very high temperature. The motion of the air as it rises can often be seen, because it carries sand and dust as far as 1,000 feet above the earth. In tropical oceans the air above the water may become heated in much the same way, and *waterspouts* are formed. See also **WATERSPOUT**.

E.S.S.

WHISKY is an alcoholic beverage distilled from grains and malt. The process of making whisky is divided into three stages, mashing, fermentation, and distillation. In the first stage, the grain is soaked in hot water to make a mash. Malt is then added to convert the starch of the grains into sugar. In the second stage, yeast is added to the mash and the mixture is allowed to ferment. The fermentation changes the sugar into alcohol. In the third and last stage, the mash is distilled to concentrate the alcohol to not more than 80 per cent, or 160 proof. This is known as *straight whisky*. Distilled water is added to bring the alcoholic content down to 40 to 50 per cent, or 80 to 100 proof. The whisky is then stored in barrels to age. *Blended whisky* is a mixture containing not less than 20 per cent straight whisky with pure alcohol and water. *Bonded whisky* is any type of whisky which contains not less than 50 per cent alcohol, or 100 proof, and which has been aged at least four years in new oak barrels which have had their insides fire-charred.



The Whipping Post and the Lash were used to punish minor law violators in many American colonial communities.

Bourbon whisky is made from mash in which corn is the chief ingredient. *Rye whisky* has rye grains as its chief mash ingredient. *Sour mash whisky* is made by using a mash which was already been fermented to make ordinary whisky. *Canadian whisky* is a distinctive product of Canada, containing no distilled spirits less than two years old. It is light in color and body. *Scotch whisky* and *Irish whisky* are made chiefly from barley malt. The smoky flavor peculiar to Scotch whisky comes from the malt, which has been dried over a peat fire.

Whisky is one of the strongest of alcoholic beverages. Its manufacture and sale are prohibited by law in some states and localities. J.B.R.

See also ALCOHOLIC DRINK.

WHISKY-JACK. See JAY.

WHISKY REBELLION. A Federal tax on United States whisky makers brought about the Whisky Rebellion of 1794. The rebellion was led by angry farmers in western Pennsylvania. These farmers found it profitable to turn much of their corn and rye crop into whisky. Whisky could be shipped to markets more easily and profitably than the bulky grain because early roads and transportation facilities were poor.

The Federal tax law permitted government agents to enter private homes and collect money directly from small whisky producers. It brought immediate protest from farmers throughout the Union. Congress grew alarmed and removed the tax from the smallest stills. This change satisfied the farmers of Virginia and North Carolina, but whisky makers in Pennsylvania still refused to pay the tax.

In the summer of 1794 the Federal Government ordered the arrest of certain Pennsylvania ringleaders who refused to pay the whisky tax. The result was a series of bitter fights between United States marshals and the rebel farmers. Several persons were killed or wounded. President George Washington then sent in troops to put down the rebellion. Two rebel leaders were convicted of treason, but Washington later pardoned them. The Whisky Rebellion was an early "testing ground" for the exercise of Federal power to enforce a Federal law within a state. E.C.B.A.R.

WHISKY RING. In United States history, the Whisky Ring was an association of whisky manufacturers and high government officials which was active in the 1870's. The conspirators banded together to cheat the United States Government of taxes imposed on distilled liquors. The Whisky Ring was one of the great American political scandals of the Ulysses S. Grant administration.

The association was formed in Saint Louis, Mo., and soon spread to other cities throughout the country. Many distillers were forced to join the ring or see their business ruined. The illegal profits were divided up among the conspiring government officials, some of whom held important positions. One of them was the chief clerk in the Treasury Department. Another high official was General Orrille E. Babcock, the private secretary of President Ulysses S. Grant.

The Treasury Department soon realized that it was losing millions of dollars in liquor revenue. Attempts were made to trace the loss, but investigation was difficult because the thieves had friends in the Treasury Department who issued warnings of government activi-

ties. Finally, in 1875 Secretary of the Treasury Benjamin H. Bristow was able to find evidence against the law-breakers, and the illegal association was destroyed. Many persons were convicted, but the leaders escaped with light punishment. J.D.H.

WHIST, *huist*, is the card game from which bridge developed. Whist began in England and dates back as far as 1674. It is played with a full pack of fifty-two cards, which rank from the ace down to the deuce. Four players play the game. The two persons sitting opposite each other are partners.

The cards are shuffled, cut, and dealt one at a time to each player in turn. The last card belongs to the dealer and is turned up to make the trump suit. The player to the left of the dealer leads a card to start the game. The others play in turn from left to right. Each set of four cards played makes a *trick*.

The object of the game is to take as many of the tricks as possible. Players must follow suit. A player may trump or discard a low card of another suit if he cannot follow the lead. The high card of the suit led, or the highest trump played, wins the trick. The winner of the trick leads from his own hand until thirteen tricks have been played.

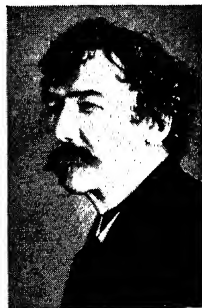
The side that takes the most tricks counts one point for every trick taken over six. Taking all the tricks makes a *slam* worth five points. Seven points make a game in the American form of whist. Other forms of the game are *long whist*, in which ten points make game, and *short whist*, in which five points are necessary to win. *Honors*, or the ace, king, queen, and jack of trumps, are counted only in long whist. Holding four honors in one hand scores four points, and three honors score two points. J.S.Mz.

See also BRIDGE; HOYLE, EDMOND.

WHISTLER, *HWIS* ler, JAMES ABBOTT McNEILL (1834-1903), is often considered the most original American artist of the 1800's. Probably his best-known work is an oil painting of his mother. Whistler was considered a master colorist, and he was also famous for his etchings, pastels, and water colors. He made almost 400 etchings and 150 lithographs, and helped to perfect lithography. His group of Venetian illustrations, his series of scenes along the Thames River, and his Little French Series placed him among the great etchers.

Whistler claimed to be a realist, but he believed that it was the artist's privilege to select only those elements of beauty which, harmoniously arranged, make the picture. This belief explains Whistler's disregard for accuracy of detail and his ability to make a scene of poverty and wretchedness a thing of beauty.

Whistler was born in Lowell, Mass. His father, Major George Washington Whistler, was an officer of engineers in the United States Army. When James was nine years



Brown Bros.
James Whistler, one of America's most noted painters



E. S. Herrman

James Whistler's Portrait of His Mother Is One of the World's Most Famous Paintings

old the family moved to Russia, where his father directed the building of a railroad for the czar. The boy studied at the Imperial Art Academy of Saint Petersburg (now Leningrad). When he returned to America he entered the United States Military Academy, but disliked military training and did not do well in his studies. He was dismissed before completing the course. In 1856 he began to study art seriously in Paris, and three years later moved to London where he spent most of the rest of his life.

Whistler's work was so individual that he was sometimes criticized. He was intolerant when others disagreed with him. John Ruskin's contempt for one of Whistler's "Nocturnes" (Whistler often called his pictures symphonies, nocturnes, arrangements, and the like) caused Whistler to sue him for libel. Whistler won damages of one farthing (half a cent). He had this coin made into a watch charm and wore it proudly. M.B.R.

His Works include "The Thames in Ice" and "Valparaiso Harbor" in the National Gallery of Art, Washington, D.C.; "Southampton Water" in the Chicago

Art Institute; and "The Ocean" in the Frick Collection in New York City.

WHISTLING BOY. See DUVEINECK, FRANK; PAINTING (color plate, Great American Paintings).

WHITE is the color of pure snow. The English scientist, Sir Isaac Newton, discovered that white light is really a mixture of all the other colors. With a glass prism he broke up white light into the other colors. He also blended the other colors to form white. An object is pure white if it reflects all colors found in light. A black object has no color from light, for it absorbs them all. An object with a special color, like red, absorbs all light except its own color, which it reflects.

We cannot make white paint by mixing colored pigments, for they do not mix in the same way as light. Pigments absorb other colors besides their own. Stores have many kinds of white paints for sale. The kind used most is made from white lead. Painters often use white as a mixer to make light tints of other colors.

White has long stood for purity. In war, a white flag is called a flag of truce, and means "stop firing." It is

raised when one side wants to talk with the other, or when a fort or ship is ready to surrender. The druids, the ancient magicians, and the priests of Osiris and Jupiter wore white robes. White is a sign of mourning in some Eastern countries, and was worn by those who mourned the death of Julius Caesar. In Siam, white elephants are sacred. The Persians believe that all the gods wear white.

See also COLOR; SPECTRUM AND SPECTRUM ANALYSIS.

WHITE, ANDREW (1579-1656). See MARYLAND (Arts and Crafts).

WHITE, ANDREW DICKSON (1832-1918), was one of the founders of Cornell University, and its first president. He later served as a United States diplomat in Germany and Russia, and led the United States delegation to the first International Peace Conference at The Hague in 1899. He was born at Homer, N.Y. See also CORNELL UNIVERSITY.

WHITE, EDWARD DOUGLASS (1845-1921), was Chief Justice of the United States Supreme Court from 1910 until his death. He was born at Lafourche, La., and became a lawyer. In 1894 he was named an Associate Justice of the Supreme Court.

WHITE, GILBERT (1720-1793), was an English clergyman and student of nature. He is best known for his book *Natural History and Antiquities of Selborne*.

WHITE, ISRAEL CHARLES. See WEST VIRGINIA (Famous Men and Women).

WHITE, JOHN (flourished 1585-1593). See DARE, VIRGINIA; LOST COLONY.

WHITE, PEREGRINE (1620-1704), was the first white child born in New England. He was the son of William and Susanna White, and was born on the *Mayflower* while it was in Cape Cod Harbor. Soon afterward his father died and his mother remarried. She then had the honor of being not only the first mother but also the first bride in the colony. T.P.A.

WHITE, RICHARD GRANT (1821-1885), was an American Shakespearean scholar and critic. Perhaps his best-known work was his *Riverside Edition of Shakespeare*. He was born in New York City. The architect Stanford White was his son.

WHITE, STANFORD (1853-1906), was a prominent American architect. He was born in New York City and studied architecture in Boston in the offices of H. H. Richardson and later in Europe. In 1880 White became a partner in the firm of McKim, Mead, and White, one of the best-known architectural firms of its time. He designed the Madison Square Tower, the Century Club, and the Morgan Library in New York City. His structures in classic style were harmonious and original contributions to the "American Renaissance" building style. His murder by Harry K. Thaw created a national sensation. M.C.C.

WHITE, STEWART EDWARD (1873-1946), was an American writer. He used the lumber camps of northern Michigan as the background for many of his novels. He was born at Grand Rapids, Mich., where his father was one of the men who helped found the great Michigan lumber industry. White enjoyed nature and made a special study of birds. He later wrote many magazine articles about them. He spent almost all his time in the woods with the lumbermen and did not start to school



Richard Morris

Stewart E. White, American writer of nature novels

He was born at Atlanta, Ga., and was graduated from Atlanta University. He was awarded a Guggenheim Fellowship in 1927 for European study and writing. White served on many commissions studying racial problems, and in 1931 became secretary of the National Association for the Advancement of Colored People.

See also GUGGENHEIM FOUNDATION; SPINGARN MEDAL. C.H.T.

His Works include the novels *Fire in the Flint* and *Flight and Rope and Faggot*, a biography of Judge Lynch.

WHITE, WILLIAM ALLEN, and **WILLIAM LINDSAY**, father and son, became well-known American journalists.

William Allen White (1868-1944) was a country editor who was known as "the Sage of Emporia." He made his small-town newspaper, the *Emporia Gazette*, one of the most famous papers in the world. White's editorials were widely read, and in 1922 he received the Pulitzer prize for the best editorial of the year.

White was born in Emporia, Kan., and was educated at Emporia College and at the University of Kansas. In 1890 he left college and took a job on the El Dorado (Kan.) *Republican*. After various newspaper jobs throughout Kansas, he returned to Emporia in 1895 and became owner and editor of the *Gazette*. A year later White wrote an editorial entitled, "What's the Matter with Kansas?" This made him famous overnight. The Republican party reprinted the article and used it in the campaign to elect William McKinley as President of the United States. From that time on, White's editorials played an important part in the political affairs of the country.

See also PULITZER PRIZES.

His works include *The Court of Boyville*; *A Puritan in Babylon*; and *The Changing West*.

William Lindsay White (1900-), William Allen White's son, won fame during World War II as a war correspondent and an author of timely books on the war.

White was born in Emporia and was educated at Harvard University. Afterward he worked with his father on the *Gazette*. In 1935 White joined the staff of the *Washington Post*, and two years later left to work for *Fortune*

until he was sixteen years old. He was graduated from the University of Michigan in 1895, and later studied law at Columbia Univer-

His Works include *Daniel Boone*, a biography for young people; *Folded Hills*; *The Forest*; *Forty Niners*; *Gold*; *Arizona Nights*; *Long Rifle*; and *Dog Days*, an autobiography.

WHITE, WALTER FRANCIS (1893-), is an American Negro writer. His work for Negro rights won him the Spingarn medal in 1937.

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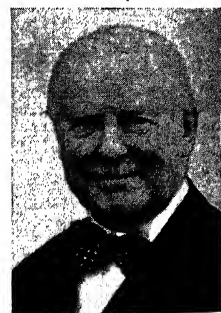
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Albert Cornwell, Macmillan Co.

William Allen White, one of the best-known of America's "country editors"

Magazine. In 1940 White joined the staff of the *Reader's Digest* as a roving correspondent.

His works include *Journey for Margaret*; *Queens Die Proudly*; and *Report on the Russians*. E.S.W.

WHITE, WILLIAM THOMAS, SIR (1866-), is a well-known Canadian financial expert and statesman. He was born in Bronte, Ontario, and was graduated from Toronto University. White studied law, but afterward turned to a business career and became a prominent financier. In 1911 he gained popularity by successfully opposing a bill preventing free trade between Canada and the United States. He was Canadian Minister of Finance from 1911 to 1919 and Acting Premier in 1918 and 1919. H.U.F.

WHITE ANT. See TERMITE.

WHITE ARSENIC. See ARSENIC.

WHITEBAIT. See HERRING.

WHITE BIRCH. See BIRCH.

WHITE-BREADED NUTHATCH. See BIRD (color plate, Birds That Help to Protect Our Trees); NUTHATCH.

WHITE CEDAR. See ARBORVITAE; CEDAR.

WHITE-CHEEKED GOOSE. See CANADA GOOSE.

WHITE CHRISTMAS. See CHRISTMAS.

WHITE CLOVER. See CLOVER.

WHITE CORPUSCLE. See BLOOD (illustration).

WHITEFACE MOUNTAIN. See ADIRONDACK MOUNTAINS.

WHITEFIELD, HWIT field, GEORGE (1714-1770), was an English clergyman. He helped John and Charles Wesley to found Methodism and became one of the Methodist leaders. Whitefield was born in Gloucester and was educated at Oxford University. Here he became a member of Charles Wesley's "Holy Club." In 1736 he was ordained a deacon, and two years later he went to Georgia as a missionary. He returned soon afterward and began to preach Wesley's Methodist doctrines. Later he broke with Wesley and in 1743 founded the Calvinistic Methodist Society. He preached throughout England and Ireland, and made seven trips to America, where he had many followers. See also METHODIST; WESLEY, JOHN, AND CHARLES. W.W.S.



Brown Bros.
George Whitefield
helped to found Methodism.

WHITEFISH is the name of a group of fishes that live in fresh water, particularly the lakes and streams of the northern regions of North America, Europe, and Asia. The whitefishes are related to the salmon family. They are among the most important food fish found in fresh water. The common whitefish of the northern American lakes is the most valuable of the whitefishes. The common whitefish has a long, compressed body. The snout is cone-shaped and the upper jaw projects beyond the lower jaw. The mouth is small and toothless. The tail is forked. This fish is bluish olive above, and silvery below and on the sides. The average whitefish weighs four pounds, and the largest rarely weigh more than twenty pounds. The common whitefish feeds on insects

and shellfish. Except at spawning time, it lives in rather deep water.

The so-called "herring" of the Great Lakes is a member of the whitefish family. It is also a fine food fish, and is even more abundant than the common whitefish. Another excellent food fish is the mountain whitefish. It lives in many mountain streams and is well known to western fishermen. The *Menominee whitefish* is a commercially valuable fish that lives in the lakes of New England and the Adirondacks, in the Great Lakes, and in Alaskan waters.

Many steps are taken to protect the common whitefish in the area around the Great Lakes. This fish lays millions of eggs, but these eggs are eaten by yellow perch, crawfish, wild birds, and other creatures. Federal and state fishery departments grow the fish in hatcheries and plant them in lakes in an effort to keep up their numbers. The fish are mostly caught by the use of gill nets and trap nets, but pound nets are also used. In spite of the warnings of scientists, the supply of whitefish has been lowered by overfishing. C.L.Hc.

See also FISH (color plate, Fresh-Water Fish).

Classification. The common whitefish is *Coregonus clupeaformis*; the lake herring or cisco is *Leucichthys artedii*; the mountain whitefish, *Prosopium williamsi*; the Menominee whitefish, *P. cylindraceum*.

WHITE FLAG. See WHITE.

WHITE-FOOTED MOUSE. See DEER MOUSE.

WHITE FOX. See FOX; FUR INDUSTRY (Names of Furs).

WHITE FRIAR. See FRIAR.

WHITE GOLD. See ALLOY (Costly and Ornamental Alloys).

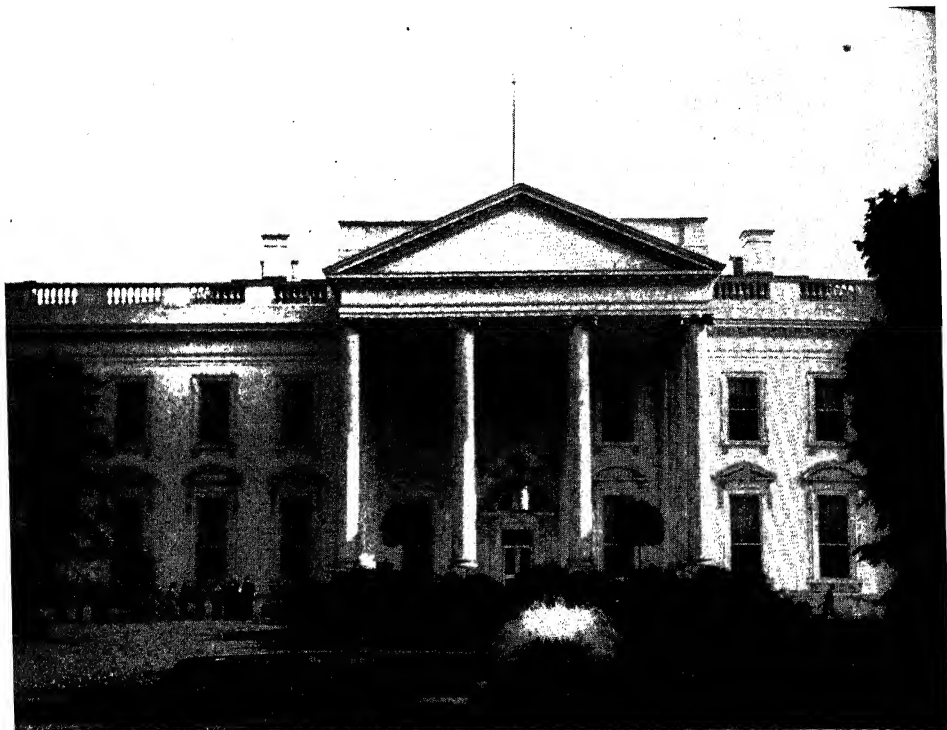
WHITEHEAD, ALFRED NORTH (1861-1947), was a mathematician and philosopher. His philosophy is deeply mystical and his writings contain mathematical symbols to express his ideas. He was born on the Isle of Thanet, Kent, England, and was educated at Trinity College, Cambridge University. He became a lecturer and writer and taught at a number of English and American universities. From 1924 to 1937 he was professor of philosophy at Harvard University. J.Cot.

WHITEHEAD, WILLIAM. See POET LAUREATE.

WHITE-HEADED EAGLE. See EAGLE.

WHITE HEART. See DUTCHMAN'S-BREECHES.

WHITE HORSE, Yukon Territory (population 754), is the trading and distribution center for the Yukon Territory of Canada. The town lies on the Lewes River, about ninety miles north of Skagway, Alaska. White Horse is the northern terminal of the White Pass and Yukon Railway, and a shipping point on the Yukon River. It is located on the Alaska Highway. The town serves as an outfitting center for big-game hunting parties. The region contains many bears, deer, moose, and other game animals. White Horse has a radio station and a good airfield. Canadian Pacific Airlines operate daily flights to White Horse from Vancouver and Edmonton. The town is the headquarters of the Royal Canadian Mounted Police for the southern Yukon district. A road connects the town with the famous White Horse Rapids and Mile Canyon on the Lewes River. Many of the gold seekers in the rush of 1897-1898 came by way of the Lewes. See also CANADA (color plate, River Boats at White Horse). J.A.D.



WHITE HOUSE. The White House, or Executive Mansion, is the official home of the President of the United States. It received the official name of White House under President Theodore Roosevelt. The White House stands on Pennsylvania Avenue, in Washington, D.C. The mansion is a two-story building of freestone, painted white. It is not very large, but it has dignity and excellent proportions. Its style of architecture is classic. On the south side stands a wide porch supported by Ionic columns two stories high. Another porch, on the north side, also with Ionic columns, serves as the chief entrance.

George Washington had proposed an official residence for the President. The building was started by 1792. James Hoban designed it after the ground plan of the house of an Irish duke. The first President to occupy the house was John Adams. When he went to live there in 1800, it was not yet finished. There were many inconveniences, and Mrs. Adams had to hang out the family washing in what is now the famous East Room.

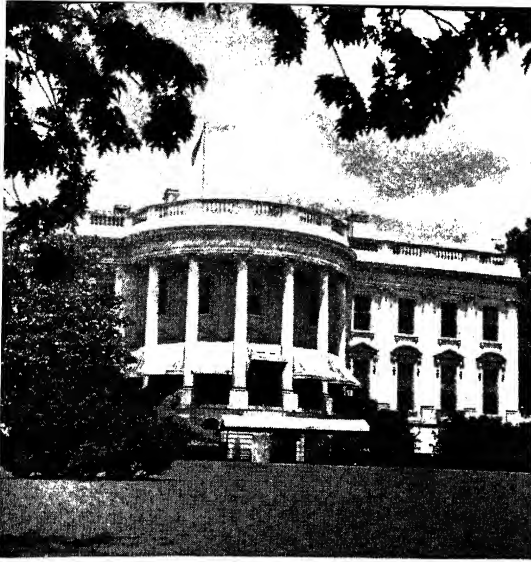
Under Thomas Jefferson's direction the White House became a more comfortable and beautiful dwelling. Jefferson added low service wings at the ends and carried out many of the original plans in design and furnishings. He also made the social life of the White House more informal than had the Presidents before him. The building has been changed and added to many times since.

During the War of 1812 the British partly destroyed the White House in 1814, while James Madison was President. They did so because the Americans had destroyed the town of York (now Toronto), in Canada, the winter before. Dolly Madison, perhaps the most brilliant hostess the White House ever knew, saved many valuable state papers by taking them with her when she fled

from Washington. By 1818 the White House had been completely repaired. At the same time the colonnades were added to the front and rear from the designs of B. H. Latrobe.

The main part of the White House measures 170 feet by 85 feet. State rooms for public affairs occupy most of the first floor. One of these is the famous East Room, 87½ by 45 feet, where public receptions are held. Diplomats are now received in the Blue Room. The Red Room is used chiefly by the ladies of the household for social affairs and to receive callers. The Green Room serves as the state dining room. Many portraits of the Presidents hang in this room. The private apartments of the President and his family are on the second floor. Here there are also guest rooms including the large Blue Bedroom, which Abraham Lincoln used as a study. (Extra guests are sometimes housed in the famous Blair House, directly opposite the White House on Pennsylvania Avenue.) The third floor, or attic, has fourteen rooms, including servants' quarters.

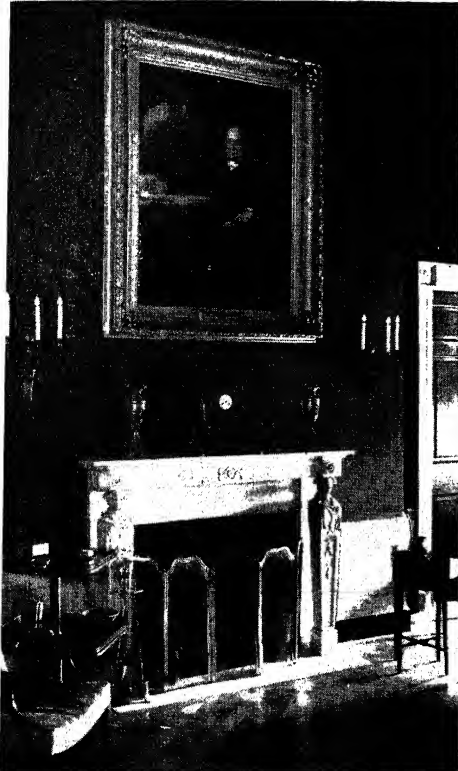
The main building has two low wings on the east and west sides. The east wing forms an entrance to the White House for the general public. The west wing contains the office of the President and his secretaries, and the Cabinet room. President Theodore Roosevelt built these wings in 1902 to replace the small service wings added by Thomas Jefferson. At the same time the building was completely repaired and restored according to the original plans. The executive offices burned during the first year of Herbert Hoover's term, but were rebuilt at once. While Franklin D. Roosevelt was in office, the wings were further enlarged. He also added an indoor swimming pool to the White House, beneath the west terrace.



The South Portico of the White House looks out over rolling lawns and beautiful gardens that stretch toward the broad Potomac River.



The State Dining Room was once used as a workroom by President Chester Arthur.



A Portrait of President John Quincy Adams looks down on the Green Room, which is used for small state dinners.

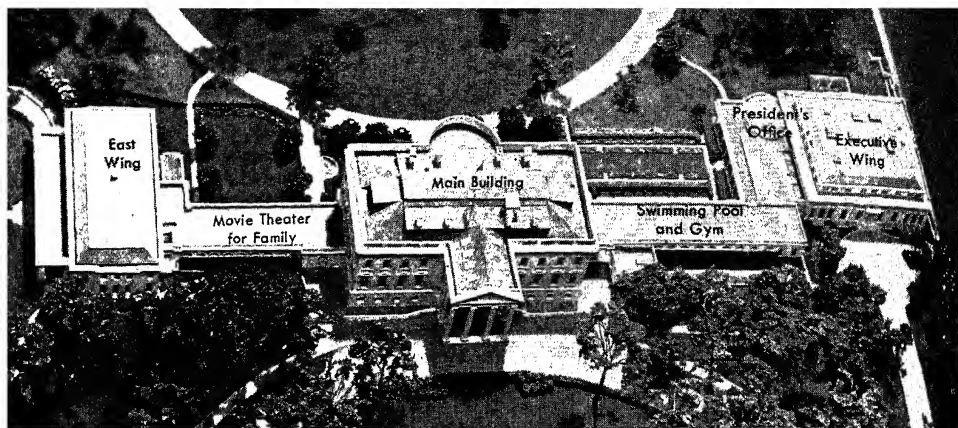


The Spacious Lobby of the White House, seen from the door of the East Room and looking toward the state dining room.



The Great East Room is used for large public receptions. Abigail Adams used the room to hang up the family laundry.

Photos: Ewing Galloway; Rideout, Black Star



Lorenzo S. Winslow, Architect

This Model of the White House Shows the Sprawling Series of Additions Added to the Original Structure

Beautiful gardens with trees, rolling lawns, and walks surround the mansion. Many of the trees were planted by former occupants of the White House. Three old elms still exist from the gay, open-air cotillion days of James and Dolly Madison. On the south side the lawn joins the park which lies between the White House and the Mall. One of the yearly affairs at the White House, the children's Easter Monday "egg rolling," is held on this lawn.

The lower floors of the White House are open to inspection by anyone who obtains a pass from his Congressman.

T.F.H.

WHITE HOUSE CONFERENCE ON CHILD CARE AND PROTECTION. See BABY (Newborn Baby).

WHITE LEAD (chemical formula, $\text{Pb}(\text{OH})_2 \cdot 2 \text{PbCO}_3$) is a pigment, widely used to make white paint. There are several processes for preparing white lead. The oldest is called the Dutch method. Layers of sheet lead are placed in earthen pots which contain a weak solution of acetic acid. The pots are then buried in spent tankard, which ferments, producing heat and carbon dioxide. The heat turns the acetic acid to vapor. This vapor and the carbon dioxide then act on the lead to produce white lead. In about three months, all the lead is changed to white lead, which is in the form of powder. The powder is then ground in linseed oil, to form the white lead sold in commerce.

Several other processes take less time than the Dutch method. But the Dutch process is still used most, for it is believed to produce the best grade of white lead.

Gases that contain sulfur compounds turn white lead black. Paints made with white lead last a long time. The pigment is used as the body of many light-colored paints, as well as for white paint.

G.L.Bu.

See also LEAD; PAINT.

WHITE LIGHT. See COLOR; LIGHT.

WHITE MAGIC, according to primitive belief, is the use of supernatural powers for a good purpose. It is the opposite to *black magic*.

WHITEMAN, PAUL (1891-), is an American orchestra conductor. He has often been called "King of Jazz." In 1919 Whiteman introduced the first "symphonic jazz." Later he conducted the first performances of such modern semi-jazz compositions as George Gershwin's *Rhapsody in Blue*. Whiteman was born

in Denver, Colo., and played first viola in the Denver Symphony Orchestra while still in his teens. Later he played in the San Francisco People's Symphony. During World War I he became a Navy bandmaster. Not long afterward he formed his own orchestra, with which he toured the United States and Europe.

G.S.A.

WHITE MONEY. See MONEY (Unusual Terms Applied to Money).

WHITE MOUNTAIN, BATTLE OF. See THIRTY YEARS' WAR (The Bohemian Period).

WHITE MOUNTAINS. The White Mountains are part of the Appalachian Mountain system. They stretch from southern Maine in a southwesterly direction into New Hampshire. The mountains are sometimes called "The Top of New England."

The White Mountains were given their name because the bare rock peaks reflect gleaming flashes of sunlight. The range is also known as "The Marvelous Crystal Hills," for the same reason.

The White Mountains lie on a plateau about 1,600 feet above sea level. The range covers an area of about 1,300 square miles. The highest part of the range, in New Hampshire, is known as the Presidential Mountains. Many of its peaks are named for presidents of the United States. Here is Mount Washington, one of the highest peaks (6,288 feet) east of the Rockies. Six other peaks in this range rise more than 5,000 feet.

They are Mounts Adams, Jefferson, Clay, Boot Spur, Monroe, and Madison. Mounts Franklin, Pleasant, Clinton, and Webster are more than 4,000 feet high.

Mount Washington is a popular summer resort. On its summit, reached by a cog railway, are a weather bureau station and resort hotels and summer homes. One of the most interesting features of this region is Crawford Notch. This is a gorge fifteen miles long, worn through the mountains by the Saco River.



Acme

Paul Whiteman helped give jazz a recognized place in the world of music.

Cliffs rise 2,000 feet above the bottom of the gorge.

The Franconia Range lies west of the Presidential range of the White Mountains. The tallest peak here is Mount Lafayette (5,249 feet). Mount Lincoln is 5,108 feet high, and Profile, Liberty, and Moosilauke mountains are more than 4,000 feet high. Wind and rain have carved one side of a huge cliff on Profile Mountain into a remarkable resemblance to a man's face. This stone profile is about eighty feet long and about 1,500 feet above the mountain road. It is called "The Old Man of the Mountain." It may have been the inspiration for Nathaniel Hawthorne's story, *The Great Stone Face*. The mountain was made a state park in 1925. Other points of interest in the Franconia Range are Mount Cho-cura, which looks like a rocky fortress or tower, and Franconia Flume, a great gorge cut by the swift Pemigewasset River. L.D., Jr.

WHITE OAK. See BIRD (Other Services); OAK.

WHITE PINE. See PINE.

WHITE PLAGUE, a name applied to tuberculosis. See TUBERCULOSIS.

WHITE PLAINS, N.Y. (population 40,327). This residential suburb of New York City lies about twenty-three miles north and east of the city. About half the working population of White Plains goes to and from work in New York City by electric trains operated by the New York Central Railroad, or by automobiles over the motor parkways which connect the two cities.

White Plains was an established settlement as early as 1735. On July 11, 1776, the Provincial Congress of New York drew up its Declaration of Independence here. White Plains was incorporated as a village in 1866 and received a city charter in 1916. The city is the seat of government of Westchester County. The Battle of White Plains was fought near by. W.E.Y.

WHITE PLAINS, BATTLE OF. This action was one of the early battles of the Revolutionary War. It was fought near White Plains, N.Y., on October 28, 1776. British troops under General Sir William Howe attacked General George Washington's positions strongly, and forced him to retreat a short distance to the northwest.

WHITE RHINOCEROS. See RHINOCEROS.

WHITE RIVER. See WABASH RIVER.

WHITE RIVER. This waterway of Arkansas rises in the Boston Mountains in the northwestern part of the state. It flows northeast into Missouri, where the waters are dammed up at Powersite Dam and Lake Taneycomo. The White River flows southeast from the dam and lake, and enters Arkansas again. A few miles above its mouths, the river forks or breaks into two *distributaries*.

One branch flows into the Mississippi River. The other branch joins the Arkansas. The total length of the White River is about 800 miles. A system of locks and dams makes it possible for river boats to sail up the White to Batesville, about 480 miles from the mouth. L.D., Jr.

WHITE RIVER BAD LANDS. See SOUTH DAKOTA (Location, Size, and Surface Features).

WHITE RUSSIAN SOVIET SOCIALIST REPUBLIC is one of the sixteen republics of the Soviet Union. It is sometimes called by its Russian name, Byelorussia or Belorussia.

The republic lies in the western part of the Soviet Union, just east of Poland. The land is covered with hills and marshes. The famous Pripyet Marshes lie in the southern part of the republic. The chief natural resources are hardwood forests and peat.

White Russia became a republic of the Soviet Union in 1919. Until 1939, it covered an area of 49,022 square miles and had a population of 5,567,976. But in that year, a region covering about 30,000 square miles and having about 4,800,000 population was added to White Russia as a result of the fourth partition of Poland. The entire region was occupied by German troops in 1941 during World War II. G.L.W.



New England Council

Profile Mountain in the White Mountains, also called "The Old Man of the Mountain." This rock formation has been carved by wind and rain to resemble a man's face.

WHITE SANDS MONUMENT. See NATIONAL MONUMENT.

WHITE SEA. This arm of the Arctic Ocean reaches into the northern part of the Soviet Union. The Onega, the Dvina, and the Mezen are the principal rivers which flow into the White Sea. Onega and Archangel are the largest cities on this sea. The White Sea is icebound from September until June, and dense fogs are common. But there is a great deal of shipping on the sea in summer between Leningrad and Archangel, and from Archangel to the Yenisei River in Siberia. Ships also can sail from the White Sea to the Caspian and Black seas by way of the Dvina, Volga, and Dnieper rivers and connecting canals. H.U.S.

WHITE SULPHUR SPRINGS, W.Va. (population 2,093). This famous health resort was named for its mineral springs. Fashionable people of the Old South visited these springs as early as 1773. White Sulphur Springs lies near the Virginia boundary. It is about 140 miles east of Charleston, the capital of West Virginia. The first settlement in the region was made about 1750. During the War between the States the Battle of Dry Branch was fought near White Sulphur Springs. After the town became a famous health resort, the *President's Cottage* was the summer home of Presidents Martin Van Buren, John Tyler, and Millard Fillmore. In 1916, the

"old White," or "summer White House" was replaced by the Greenbriar Hotel, a beautiful Georgian building on a 2,000-acre estate. During World War II the hotel became Ashford General Hospital, for wounded soldiers. It reverted to former ownership in 1946. R.B.Co.

WHITE-TAILED DEER. See **ANIMAL** (color plates, Color Protects Them; North America); **DEER**; **PAINTING** (Great American Paintings, color plate, Virginia Deer).

WHITE WALNUT. See **BUTTERNUT**.

WHITWASH is a white mixture made from whiting, glue, water, common salt, rice flour, and unslaked lime. It is used instead of paint to put a coating on such surfaces as basement walls, the walls of lighthouses, the inside walls of barns, fences, and other spots where a clear white is desired and where paint is too expensive to be practical. Whitewash is applied with a brush, in much the same manner as paint. A heavy coating of whitewash over rough mortar plaster closes the pores of the plaster against moisture and dirt. J.R.K.

WHITEWEED. See **DAISY**.

WHITE WHALE. See **BELUGA**.

WHITE WILD INDIGO. See **FLOWER** (color plate, Prairie Flowers).

WHITE-WINGED BLACKBIRD. See **BUNTING**.

WHITE-WINGED CROSSBILL. See **CROSSBILL**.

WHITEWOOD is a name given several trees with light-colored wood, especially the basswood, cottonwood, and tulip trees. See **BASSWOOD**; **COTTONWOOD**; **TULIP TREE**.

WHITING. See **CALCIMINE**; **CHALK**.

WHITING, a fish. See **HAKE**.

WHITLOCK, BRAND (1869-1934), was an American writer and diplomat who served as Minister to Belgium during World War I. He won world-wide admiration for his efforts to help the suffering Belgian people during the early days of the war. Whitlock was born in Urbana, Ohio, and attended high school in Toledo, Ohio. He worked for a time as a newspaper reporter, but afterward turned to law and in 1897 began to practice in Toledo. In 1905 he became mayor of Toledo, and served for four terms. During his long political and diplomatic career he wrote eighteen books. E.E.R.O.



Harris & Ewing

Brand Whitlock was U.S. Minister to Belgium during World War I.

His Works include *Forty Years of It*; *The Stranger on the Island*; and *J. Hardin and Son*.

WHITLOW, HWIT loh. A whitlow is a painful, inflamed condition of the fingers, and sometimes of the toes. It is one form of the infection known as *felon*. A whitlow generally forms dark tissue around and under the nail. As a rule it is caused by septic material that has entered through a small wound or pin prick. One type of whitlow is at the surface, and another is deep. The deep kind generally requires an incision, sometimes to the bone. Hot packs should be used at once, and if there is pus it should be drained off. Whitlows may last

only a few days, or they may stay for weeks or months. If simple home treatment does not help a whitlow, a physician should be called. The swelling may spread up the arm to the joints, sometimes causing death. P.R.C.

WHITMAN, MARCUS (1802-1847), was an American pioneer, doctor, and missionary among the Indians. In 1836 he traveled with his wife and two explorers to the site of the present city of Walla Walla, Wash. Their wagon was the first to cross the Rocky Mountains, and they led the way for the great overland trips of later days. There were quarrels between Whitman's party and other missionaries who followed, and the board of missions refused Whitman further support. He traveled from Walla Walla to Boston in midwinter, walking much of the western part of the trip, and persuaded the board to change its decision.

The Indians in those days expected religion to bring material blessings. When an epidemic of sickness struck the mission, the missionaries gave Indian and white children the same medicine. But the Indian children were not used to white people's diseases. They died, while many white children lived. In 1847 the Indian parents, probably in the belief that their children had been poisoned, murdered Whitman, his wife, and twelve companions. The massacre led to a war with the Indians.

Whitman was born in Rushville, N.Y., and studied medicine at the Berkshire Medical Institution, Pittsfield, Mass. He practiced for four years in Canada before he became a missionary. W.S.C.

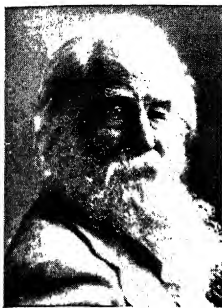
WHITMAN, WALT (1819-1892), was one of the greatest of American poets. His poems sing the praises of America and democracy, and many Europeans consider him the national poet of America.

Whitman was born at West Hills on Long Island, New York. His ancestors were of Dutch and English stock, and had been early settlers in Connecticut and Long Island. Whitman's boyhood was spent in the Long Island countryside and in the elementary schools of Brooklyn, N.Y. At the age of twelve he became an apprentice in a newspaper and print shop in Brooklyn. Later, between periods of schoolteaching, he worked as a typesetter and printer for several small newspapers on Long Island and gradually progressed into writing and editing. At the age of nineteen he published a short-lived weekly newspaper, *The Long Islander*, which he wrote, printed, and delivered himself. In 1842 he wrote a commonplace novel on temperance called *Franklin Evans*.

From 1846 to 1848 Whitman edited the *Brooklyn Eagle*. In this newspaper, his articles on political questions, civic affairs, education, public health, the condition of women, prison reform, books, music, and the



Visual Education Service
Marcus Whitman, missionary of the Northwest



Ewing Galloway

Walt Whitman set a new standard of American poetry.

theater reflected his widespread interests. He passionately opposed the breaking up of the Union, and his violent attacks on slavery finally cost him his job. After a few weeks in New Orleans as a newspaperman, he returned to Brooklyn to take an even greater part in the anti-slavery movement as editor of *The Freeman*.

From 1840 to 1855 Whitman worked on the poems for *Leaves of Grass*. Long before he had settled on the

pattern of the book, much of its content and some of its form had appeared in his newspaper writing and in his notebooks. During these years he was an active member of debating societies. He also attended theaters, concerts, lectures and political meetings. He had a great love for crowds of all sizes. He enjoyed a clambake as much as an opera, and wrote of both. He was always more interested in the people than in the occasion. Whitman often rode on stagecoaches or ferries just to talk with the drivers and boatmen and to mix with the passengers. But he also spent much time alone thinking or reading.

Out of this richly balanced experience came *Leaves of Grass*. The first edition in 1855 was only a thin volume of ninety-five pages. Twelve pages were a remarkable preface in which the poet said "The United States themselves are essentially the greatest poem."

Leaves of Grass was little noticed at first except for a prophetic letter from Ralph Waldo Emerson. In it he said to Whitman, "I greet you at the beginning of a great career."

From then on the expansion and revision of *Leaves of Grass* was Whitman's central purpose in life. But the War between the States brought an interruption. Whitman spent the years from 1863 to 1865 as a volunteer nurse and companion to the wounded in the crowded military hospitals near Washington. His experiences there are recorded in the prose work *Specimen Days* and in the *Drum Taps* section of *Leaves of Grass*. His personal experiences in the war and his knowledge of the suffering it brought strengthened Whitman's devotion to the Union, his passion for liberty, and his pride in the youth of America.

From 1865 to 1873 Whitman worked in various government departments in Washington until a slight stroke of paralysis forced him to retire. His poems were by that time more widely read. Many readers disliked them, and at one time Whitman lost one of his government jobs when people learned who he was. In 1873 Whitman settled down to a peaceful life in Camden, N.J. There many of his admirers and followers came from great distances to talk with him. Whitman never married. A number of European writers and critics, including Lord Tennyson, John Ruskin, Dante Gabriel Rossetti, and others started a movement to help Whitman financially. This movement astonished American

critics who had dismissed him as a second-rate scribbler.

Whitman came to be known as the "good gray poet" and most pictures of him show him as a bearded old man. But *Leaves of Grass* is basically the work of a young American in a time of frontier expansion and the beginnings of modern technical science.

Until his death, Whitman continued to work on *Leaves of Grass* and certain prose pieces such as *Democratic Vistas*. These in their turn have deeply influenced students of modern society, poets, and critics. Many consider his work the scripture of American democracy in verse. Whitman's unconventional free verse shocked many early readers. Today his purpose in breaking with the old-style meters is accepted. Biblical and oratorical rhythms are basic in his poems. His lines suggest the rise and fall of the sea he loved so much.

Whitman held deep convictions about "the American idea . . . the Great Idea, the idea of perfect and free individuals." His love of America grew from a faith common to many people of his time. This faith was that in America a person had a chance to reach heights still unknown to mankind. But Whitman carried this idea far beyond the narrow national view of some of the other people of his time. He said once, "The chief reason for being of the United States of America is to bring about the common goodwill of all mankind, the solidarity of the world." G.T.

His Works. Nine editions of *Leaves of Grass* were published in Whitman's lifetime. Each had been added to so that the final edition included such poems as "Song of Myself"; "There Was a Child Went Forth"; "Song of the Exposition"; "Song of the Broad-Axe"; "Out of the Cradle Endlessly Rocking"; "Pioneers, O Pioneers"; and the two well-known poems on the death of Abraham Lincoln, "When Lilacs Last in the Door Yard Bloom'd" and "O Captain! My Captain!" His prose works, besides *Democratic Vistas*, include a number of notable prefaces of the various editions of his books.

WHITMAN COLLEGE is a privately controlled, coeducational school of liberal arts and sciences at Walla Walla, Wash. Courses lead to B.A. and M.A. degrees. All out-of-town women students are required to live in dormitories or sorority houses. In the first year out-of-town men students live in dormitories, and afterwards in fraternity houses or other residences. Whitman is the oldest college in Washington. It was founded in 1859 and has an average enrollment of about 600. D.V.Mc.

WHITMAN NATIONAL MONUMENT. See NATIONAL MONUMENT.

WHITNEY, ADELINE DUTTON TRAIN (1824-1906), was an American writer of poems and novels for young people. Probably her best-known story is *Faith Gartney's Girlhood*. She was born and educated in Boston and began writing for magazines as a young girl. L.J.

Her Works include *Patience Strong's Outings*; *A Summer in Leslie Goldthwaite's Life*; *Parasies*; and *We Girls*.

WHITNEY, ELI (1765-1825), was an American inventor whose cotton gin greatly changed American industry. This invention made cotton growing profitable. With the use of the gin the United States became the largest producer of cotton in the world. Whitney's invention also played a great part in history. Without it slavery might have been unprofitable and the War between the States might never have been fought.

Whitney, the son of a well-to-do farmer, was born in

Westboro, Mass. He was graduated from Yale College in 1792 and went to Georgia as a private tutor. Whitney intended to study law in his spare time. After he arrived in Georgia, he found that someone had already taken his position. Whitney was about to return but a friend, General Nathaniel Greene's widow, invited him to stay at her home as a guest while he studied law. Whitney was a skilled mechanic and he made himself useful by fixing things around the house. One evening several guests remarked that cotton-growing was unprofitable because of the time spent in separating the seed from the cotton. The hostess suggested that Whitney invent a machine for this task. Whitney agreed to work on it, and within ten days he constructed a rough model of the cotton gin. By April, 1793, he had finished a machine with which one man could produce fifty pounds of clean cotton a day.



Brown Bros.

Eli Whitney invented the famous cotton gin.

In 1794 Whitney obtained a patent and with a partner, Phineas Miller, began to manufacture cotton gins in New Haven, Conn. They intended to buy raw cotton, separate it, and sell the finished product. Whitney hoped to monopolize the market with his invention, but his plans had been stolen and other men built and operated similar cotton gins. Whitney sued them, but it took years of long, drawn-out trials for him to prove his sole right to the patent on the cotton gin. In the meantime his factory burned down and his partner died. Whitney lost all interest in the invention and turned to the manufacture of firearms.

In 1798 he established a factory at Whitneyville, Conn., and began to produce firearms by a new prin-

ciple. In this factory Whitney was the first manufacturer to prove the efficiency of manufacturing all parts separately and standardized so that the completed product could be assembled later. This principle proved so successful that even unskilled workers could operate the simple machines and turn out parts. Whitney received many contracts and the factory made him a rich man. During his lifetime he received little credit or money for the invention of the cotton gin. Fame came to him only after his death, when it was clearly proved that he had been the first to invent the machine.

E.Y.

See also COTTON (History of Cotton); COTTON GIN; MASS PRODUCTION.

WHITNEY, MOUNT. This peak, rising 14,496 feet, is the highest mountain in the United States, except Mount McKinley (20,300 feet), in Alaska. Mount Whitney lies in the southern part of the beautiful Sierra Nevada Range of California. A cluster of granite pinnacles and domes rises abruptly to a height of over 10,000 feet above the valley below. Mount Whitney was named for the American scientist, Josiah Dwight Whitney (1819-1896), who was state geologist of California from 1860 to 1874.

L.D., Jr.

See also MOUNTAIN (illustration, Highest Mountains of the World).

WHITNEY, WILLIS RODNEY (1868-), is an American chemist. As director of the research laboratory of the General Electric Company, from 1900 to 1928, he became known for many of the discoveries made under his direction. In 1928, he was named vice-president in charge of research for the company.

WHITSUNDAY. See PENTECOST.

WHITTIER, *WHIT* in er, JOHN GREENLEAF (1807-1892), was one of the best-known of American poets. His life and his poetry were closely connected with his Quaker faith, and he was called the "Quaker Poet." His religious beliefs made him a bitter enemy of slavery. Many of his poems attacked the slave system. But his best-known works are about the New England farmer

California's Majestic Mount Whitney Is the Highest Mountain in the United States



and villager. His "Barefoot Boy," which was a favorite with school children, tells of his own boyhood on the farm. *Snowbound*, which is generally considered his best poem, tells in bright images of the pleasant life on a farm cut off by a snowfall.

Early Life. Whittier was born at East Haverhill, Mass. As a boy he received little education, and the only book he owned and read was the Bible. When Whittier was about fourteen, his teacher read him the poems of the Scottish poet Robert Burns. The boy loved these poems, and he soon began to write verses himself. When he was eighteen his older sister sent one of his poems to the Newburyport *Free Press* and it was published. The editor, William Lloyd Garrison, became interested in the author and visited him. Garrison encouraged the young man to continue his education. Whittier worked at making slippers and taught for a while in order to earn enough money for his schooling. He attended the Haverhill Academy for two terms and afterward took a job as editor of the *American Manufacturer*. In the meantime he continued to write poetry, and published many poems in other newspapers. In 1830 he became editor of the *Essex Gazette*, which had published many of his poems. He later edited the *Pennsylvania Freeman* and the *National Era*.

The Poet of Abolition. At this time Mary Emerson Smith, the girl he had loved since boyhood, married another man. Whittier was heartbroken and remained a bachelor the rest of his life. Soon afterwards he began to devote himself to the antislavery movement, and in 1833 published the pamphlet *Justice and Expediency*. From that time on he became the great poet of the Abolitionist movement. He served a term in the Massachusetts Legislature, but refused a second term because of his poor health.

A Leading Poet. Whittier's health gave him constant trouble, but he continued the fight against slavery. Once, on a lecture tour, he and a companion were mobbed and severely beaten. Another time a mob burned down his office in Philadelphia. He edited many antislavery papers and wrote articles for other newspapers. But at the same time he wrote poems on other subjects. In 1843 he published *Lays of My Home and Other Poems*, and began to be recognized as one of the leading American poets. In 1846 he published a collection of his antislavery poems, *Voices of Freedom*. In the 1850's he wrote "Maud Muller," "Barefoot Boy," and many other poems of New England life. At the time of the War between the States he was at the height of his fame. Whittier's "Song of the Vermonters 1779" is still sung by balladists. Every hymnbook contains his work. His beautiful "Dear Lord and Father of Mankind" was set to fitting music in 1887.



Brown Bros.
John Greenleaf Whittier,
New England poet

Last Years. After the war he gave up politics and devoted himself to literature. In 1866 he wrote *Snowbound*. The book sold so well that he became wealthy. His mother and sister were dead, and his niece kept house for him. In 1876 she married, and Whittier went to Danvers, Mass., to live with his cousins. Here a stream of admirers came to see the poet. He died while on a visit to New Hampshire.

Estimate of His Work. Whittier's reputation has declined, and today he is considered only a minor poet. His poems are read and enjoyed by children, and are familiar to all grownups. But outside the schools he is little read today although his works contain much to interest good readers. His ballads are sometimes rough, poorly rhymed, and badly worded. Whittier is the poet of country people, and his poems are part of American history.

G.T.

See also ABOLITIONIST; BARBARA FRIETCHIE.

His Works include *Songs of Labor; The Panorama and Other Poems; and In War Time and Other Poems*, which contains the well-known poem "Barbara Frietchie."

WHITTIER COLLEGE is a coeducational, liberal arts school at Whittier, Calif. It is controlled by the Society of Friends, or Quakers. A division of the college is the Broad Oaks School for the training of nursery-school and kindergarten teachers at Pasadena, Calif. Whittier was founded in 1901. Its enrollment averages 700. W.C.J.

WHITTINGTON, "DICK," RICHARD (1358?-1423), was an English merchant whose name is connected with a popular legend. According to the story, Whittington began his career as an apprentice to a London merchant. This merchant was about to send a ship full of useful things to sell to a foreign port. He told young Whittington he could send one of his own possessions to be sold, and the young man chose his cat. The merchant laughed, but the cat proved to be the most valuable item in the cargo. The king of Barbary, whose kingdom was overrun with rats, bought it for an enormous sum.

In the meantime, the merchant's cook had mistreated Whittington, and the young man had run away. When the captain of the vessel returned with the money for the young apprentice, he was unable to find him. But as Whittington ran through Newgate, he thought he heard the Bow Bells ringing and saying the words, "Turn again, Whittington, Lord Mayor of London." Whittington returned to the merchant and learned of his good fortune. In time the words the bells had rung came true, and Whittington was three times Lord Mayor of London. P.V.B.J.



Brown Bros.

Dick Whittington grew up to become three times Lord Mayor of London.

WHITTLE, FRANK (1907-), is one of the leading pioneers in the development of jet-propelled aircraft. He was born in Coventry, England, the son of an inventor. At sixteen he became an apprentice in the Royal Air Force, and at twenty-one he was an officer in a fighter squadron. A year later he became inspired with the idea of jet propulsion, and he got leave to study engineering and science for four years, mostly at Cambridge University. He built his first experimental engine on borrowed money, and then received the support of the British Air Ministry. The first successful test flight of his engine took place in May, 1941. Whittle then came to the United States to help in the manufacture of the plane. See also **JET PROPULSION**. J. Cor.

WHITTLING. See **HOBBY** (Books about Hobbies [Wood Carving and Whittling]).

WHITWORTH COLLEGE is a coeducational school of liberal arts at Spokane, Wash. It is controlled by the Presbyterian Church. Whitworth College was founded in 1890 and has an average enrollment of about 250.

WHOLESALE EMPLOYEES OF AMERICA, UNITED. See **RETAIL, WHOLESALE AND DEPARTMENT STORE EMPLOYEES OF AMERICA, UNITED**.

WHOLESALE. See **DISTRIBUTION** (Distribution of Goods); **SALESMANSHIP** (Salesmanship as an Occupation).

WHOLE WHEAT. See **FLOUR** (Kinds of Flour).

WHOOPIING, HOOP ing, COUGH is a highly contagious disease which affects children more often than adults. It is more serious than most persons think. Whooping cough kills many persons every year by bringing on other conditions like bronchitis, pneumonia, hemorrhage, and convulsions. Sometimes the patient may become blind or deaf, or catch tuberculosis more easily because he has had whooping cough.

A person can catch whooping cough at any age, but an adult has a better chance to recover than a child. One attack almost always makes the patient immune from other attacks. A very few persons are naturally immune, but babies up to six months old are hardly ever immune. Negroes seem to catch the disease much more readily than white people.

The early symptoms of whooping cough are a slight fever and a dry cough. After a few days of the cough, the symptoms grow worse, particularly at night. They come in spells, or paroxysms, and the spells usually cause vomiting. Any child who shows these signs should be kept away from other children. About a week later, most children coming down with the disease begin to give the whoop — a long drawing in of the breath that sounds like a high crow. But the parent must not wait until the whoop to find out if the child has the disease. A doctor can recognize the disease in other ways, much earlier than the whoop.

There are four or five coughing spells a day even in mild cases. Severe cases bring many more. More frequent attacks come from overeating, crying, excitement, or too violent exercise. The climax occurs about the end of the fourth week. Then the spells gradually grow fewer and less severe. Sometimes, especially in cold weather, the whoop goes on for two or three months. Any fever after the climax should be reported to the doctor at once. It might mean that some complication is starting.

If a child has whooping cough, his mother must be

careful to keep him away from other children. The disease spreads very rapidly through the spray, which can travel five feet in ordinary conversation and eighteen feet by coughing. During coughing attacks, the discharges from nose and mouth should be caught in a piece of cloth. The cloth should then be burned. The patient should have his own dishes, silver, washcloths and towels. It is important to give a child his usual nourishing food, and to have the sleeping room well ventilated. Fresh air is one of the best aids in curing the disease. The child should play outside — by himself — as much as possible in good weather, after the acute symptoms have abated. He should wear flannel underclothes to prevent chilling. The mother or nurse should be near the child at all times, for suffocation or convulsions are possible.

Prevention. Special care is needed in keeping babies away from whooping cough. It is especially severe on babies less than two years old. A vaccine has been developed which makes a person immune, in a high percentage of cases, 85 to 90 per cent, and seems to make the disease less severe in others. If a person has been exposed, and then contracts a cough with the symptoms of the disease, he must be kept away from others. After that, the disease becomes much less contagious, and the quarantine can gradually become less strict. J. L. L.

WHOOPIING CRANE. See **CRANE**.

WHORTLEBERRY, HWUR t'l BER ih. See **HUCKLEBERRY**.

WHYMPER, HWIM per, EDWARD (1840-1911). See **MATTERHORN**.

WICHITA, WICH ih taw, Kan. (population 114,966), is the distributing center for a large farming region which produces grains, livestock, and dairy products. The city lies at the meeting point of the Little Arkansas and Big Arkansas rivers in south-central Kansas. Wichita is about 200 miles southwest of Kansas City. The city is the home of the Friends University (Quaker), and the Municipal University of Wichita.

Industry and Trade. Wichita is one of the leading farm-machinery distributing points in the United States. One of the largest markets for broomcorn in the world is in Wichita. The city lies in the Midcontinent oil fields, and has a number of petroleum refineries. During World War II the four airplane factories in Wichita produced more complete warplanes than those of any other city. There are more than 300 manufacturing plants of all types, including factories making oil-well equipment, lamps and stoves, refrigerator cars, and farm machinery. There are several flour and alfalfa mills and iron foundries.

Transportation. Wichita is served by the trunk lines of five railroads. Motorbus and truck lines enter the city from all directions. The Wichita municipal airport covers 1,830 acres.

History. The site of Wichita was a buffalo hunting ground for the Plains Indians until 1870, when a railroad crossed this point. The temporary settlement that sprang up was named from the Indian words for *Village of Grass Lodges*. The village became a shipping point for longhorn cattle driven to the railroad north from Texas on the Chisholm Trail. Wichita was incorporated in 1871, and chartered as a city in 1872. It is the county

seat of Sedgwick County. The city has had the commission form of government since 1909. K.Ms.

WICHITA, MUNICIPAL UNIVERSITY OF, is a coeducational school controlled by the city of Wichita, Kan. It has colleges of liberal arts and sciences, business administration and industry, education, and fine arts. The University has a four-year program in aeronautical engineering and administration. The school was founded in 1892. Its enrollment averages about 1,600. W.M.J.

WICHITA FALLS, Tex. (population 45,112), is headquarters for the oil industry in north-central Texas. Wichita Falls lies on the Wichita River about 110 miles northwest of Fort Worth. The city is the home of Hardin Junior College and Wichita Falls State Hospital.

Wichita Falls has oil refineries and factories for making oil-well equipment. The city has one of the largest flour mills and glass fruit jar factories in the Southwest. Other leading industries of Wichita Falls include the production of leather goods, foundry products, air-conditioning equipment, cottonseed products, and various processed foods.

Wichita Falls was established in 1882 as a station on the Fort Worth and Denver City Railroad. It was incorporated as a city in 1889. The council-manager form of government was adopted in 1928. S.A.MacG.

WICKERSHAM, GEORGE WOODWARD (1858-1936), was an American lawyer and statesman. He was born in Pittsburgh, Pa., and was educated at Lehigh University and the University of Pennsylvania. Wickersham became a noted lawyer in New York City, and served as Attorney General in the cabinet of President William Howard Taft. In later years he was perhaps best known as chairman of the National Commission on Law Observance and Enforcement, which President Herbert Hoover set up in 1929 to study the problem of enforcing the prohibition laws. W.Se.

WICLIF, JOHN. See WYCLIFFE, JOHN.

WIDDEMER, MARGARET (1880?-), is an American writer of poetry and fiction. She was born in Doylestown, Pa., and was privately educated. She at first did library work, and then began to write. L.J.

Her Works include the books of poems *Ballads and Lyrics* and *Collected Poems*; the novels *All the King's Horses* and *Some Day I'll Find You*; and the books for young people *Binkie and the Bell Dolls* and *Little Boy and Girl Land*.

WIDGEON, WIF un, is the name of two kinds of river ducks found in North America and in Europe. The American *widgeon*, or *baldpate*, is a bird that hunters locate by its characteristic note, *whew, wheew, wheew*, uttered while swimming and feeding. See **BALDPATE**.

The European *widgeon* is found in the northern part of the Old World, and very occasionally in the United States. Both species are about nineteen inches long. The females lay seven to twelve buffy-white eggs in ground nests near water. J.J.H.

See also **DUCK**.

Classification. Widgeons belong to the family *Anatidae*. The American species is *Mareca americana*; the European, *M. penelope*.

WIELAND, VE laht, **CHRISTOPH MARTIN** (1733-1813), was a German poet and writer of fiction. He was born at Oberholzheim, in Württemberg. Wieland

studied law at the University of Tübingen, but showed far more interest in literature. He began his literary career by undertaking a great epic on the deeds of Cyrus the Great. At the age of twenty-six he had finished five cantos, but he found the task too great. He gave up the epic and wrote *Araspe* and *Panthea* instead.

By 1759 he was intensely interested in Greek literature, especially its poetry. Under this new influence, he wrote "Nadine," a poem filled with the Greek joy of life; *The Adventures of Don Silvio*, a tale modeled on *Don Quixote* and ridiculing cold idealism; and the *Comic Tales*, written in sheer fun. He also translated twenty-two of Shakespeare's plays into German.

Wieland was appointed professor of philosophy at the University of Erfurt in 1769, but three years later he accepted the invitation of a duchess to teach her sons. He then produced much vigorous and dramatic poetry, novels, and translations, and his famous romantic epic, *Oberon*. L.J.

WIEN, veen, is the official name for Vienna. See **VIENNA**.

WIENIAWSKI, vyeh NYAHF shee, HENRI (1835-1880), was a Polish violinist and composer. He was born in Lublin, and at the age of eight began to study at the Paris Conservatory. He gave his first concerts in Poland and Russia when he was thirteen years old. In 1860 he was appointed solo violinist to the Czar. He also taught violin at the Saint Petersburg Conservatory. In 1872 he toured the United States with the pianist Anton Rubinstein. Two years later, Wieniawski followed Henri Vieuxtemps as professor of violin at the Brussels Conservatory. G.B.

His Works include the "Violin Concerto No. 2 in D minor"; "Scherzo Tarantelle"; "Souvenir de Moscou"; "Fantasie on Gounod's Faust"; and "Légende."

WIESBADEN. See **GERMANY (Cities)**.

WIESE, VEE zeh, KURT (1887-), is an American illustrator and writer of books for young people. His illustrations of animal stories are especially well known, as are also his books on Chinese subjects which he wrote and illustrated. Wiese was born in Minden, Germany. In 1909 he went to Tsingtao, China, as an export trader. When World War I broke out, Wiese was captured by the Japanese and was sent to Australia as a prisoner. In the camp there he began to draw pictures and after the war he began illustrating books and magazines in Germany. His pictures of animals for Felix Salten's *Bambi* were particularly successful. Later he lived in Brazil and the United States. H.B.O.

His Works include *Liang and Lo; The Chinese Ink Stick; Karoo the Kangaroo; Wallie the Walrus; and You Can Write Chinese*.

WIFE. See **FAMILY; HOME LIFE; HUSBAND AND WIFE**.

WIG. A false covering of hair for the head is called a wig. The name is a shortened form of the word *periwig*. The custom of wearing wigs is very old. Egyptian mummies have been found with them. We know that the ancient Greeks and Romans wore them. In the 1700's the French made wigs a very fashionable item of dress. Wigs then became very large and heavy, and were very expensive. Some of them were piled high on the head in a *pompadour* style. Usually they were powdered white. Some of them had long braided pigtails at

the back. Others had many curls. Wigs were worn by nobles and great ladies, courtiers, ministers, judges, and many doctors and professional men. English judges began wearing wigs in the days of Queen Anne and still wear them today. Wigs were also popular in colonial America. Pictures of George Washington in his white wig are familiar to everyone. Today wigs are worn mostly on the stage, in motion pictures, and by persons who have lost all, or most of, their natural hair. See also HAIRDRESSING. M.E.V.

WIGGIN, KATE DOUGLAS (1856-1923), was an American writer. Her books include novels and books for young people. She was born in Philadelphia and was educated at Abbot Academy, Andover, Mass. At the age of eighteen, she went to Los Angeles, Calif., to teach. In 1878 she founded in San Francisco the first free kindergarten on the west coast. Two years later she established the California Kindergarten Training School in San Francisco.

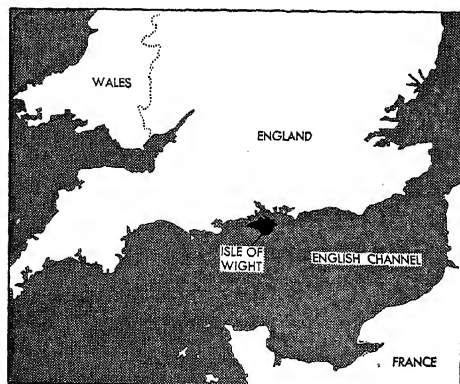
Kate Douglas Wiggin's first story, which was published in 1888, was *The Birds' Christmas Carol*. It is still popular with children. This was followed by other stories for young people. In 1902 she began to write a number of novels which were for adults but were about young people. These include the successful *Rebecca of Sunnybrook Farm* and *Mother Carey's Chickens*. L.J.

WIGGLESWORTH, MICHAEL (1631-1705). See AMERICAN LITERATURE (History [The Beginnings]).

WIGHT, wife, ISLE OF. The Isle of Wight is off the southern coast of England. The strait called The Solent separates the little island from the mainland county of Hampshire. The island covers an area of 147 square miles, and has an estimated population of 88,454.

The Isle of Wight is famous for its mild, pleasant climate and its beautiful scenery. A range of chalk cliffs crosses the island from east to west. The beauties of the island attract many tourists and visitors. The chief town is Newport (estimated population 11,313), and the leading port is Cowes (estimated population 10,179), which is famous for its yacht races.

The island has regular steamship connections with the English cities of Southampton, Portsmouth, and Lymington. Railroads connect all the important points on the island. The chief industries are farming and



Location Map of the Isle of Wight

sheep raising. Wool from the sheep of the island is world-famous for its fine quality.

Osborne House is one of the well-known landmarks of the island. It was a favorite home of Queen Victoria of Great Britain, and was the place where she died. Another famous building is the Carisbrooke Castle, where King Charles I (1600-1649) was imprisoned during his struggle with Parliament. The island also has many ancient relics of the Roman occupation. F.H.H.

WIGMAN, MARY (1886-), is a German dancer who has played an important part in the modern dance movement. She was one of the first to free the dance from its dependence on music, drama, or any other art. According to her theory of the dance, the human body is an instrument for expressing ideas and emotions. She created a large number of highly original dances expressing ideas all the way from humor to concern for the fate of mankind. Mary Wigman was born in Hanover and was educated in private schools. She began her dancing career at the age of twenty-seven. Her ideas were revolutionary and were at first unpopular. In 1923 she toured Europe with her own group of dancers and was widely praised. Several years later she repeated her success in the United States. See also DANCING (Modern Dance). M.C.C.

WIGWAGGING. See FLAG.

WIGWAM is the name for a kind of dwelling used by the Algonkian-speaking Indians of the Eastern Woodland. In the East, the foundation was usually an oval-shaped dome of light poles tied together with bark. The covering was layers of bark (birch or elm) or perhaps reed mats, laid on in shingle fashion. In the Mississippi Valley the "wigwam" sometimes had a rectangular frame and gabled roof. Some northern Algonkians used a cone-shaped tent, but this was more common on the Plains, and is known by the Siouan word *tepee*. See also TEPEE. R.M.U.

WILBERFORCE, WILLIAM, and SAMUEL, were noted Englishmen, father and son. The father was a statesman, and the son was a prominent clergyman.

William Wilberforce (1759-1833) led the fight against slavery in the British Empire. He was born at Hull, and studied at Saint John's College, Cambridge University.

Wilberforce was elected to Parliament by his native town in 1780. In 1787 he began his campaign against the slave trade. Two years later the House of Commons passed a resolution which condemned the slave trade. In 1792 it passed a bill which provided for the gradual abolition of slavery. But both houses of Parliament did not finally agree to an immediate end to the slave trade until 1807. After this agreement was reached, many slaves still remained in the British Empire. Wilberforce then worked for law to end slavery entirely.

He continued his fight until 1825, when failing health forced him to resign from Parliament. But the movement against slavery continued and the Emancipation Bill became law a few weeks after he died. Wilberforce was



Brown Bros.

William Wilberforce helped rid the British Empire of slavery.

law to end slavery entirely.

honored by being buried in Westminster Abbey. A.M.
See also SLAVERY.

Samuel Wilberforce (1805-1873), the third son of William Wilberforce, was born at Clapham Common, London, and studied at Oriel College, Oxford University. In 1830 he became a rector at Brightstone on the Isle of Wight and rose rapidly to prominence as a clergyman. In 1845 he was made bishop of Oxford. Here he became a leading member in the Tractarian, or Oxford, Movement.



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Samuel Wilberforce was a noted orator.

In 1869 Wilberforce became bishop of Winchester. He was a member of the House of Lords and was nicknamed "Soapy Sam" because of his oratorical abilities.

See also OXFORD MOVEMENT.

WILBERFORCE UNIVERSITY is a coeducational school for Negroes at Wilberforce, Ohio. It has a college of liberal arts, a college of education and industrial arts, and the Payne Theological Seminary. Wilberforce is the oldest Negro university in the United States. It was founded in 1855 by the African Methodist Episcopal Church, and has an average enrollment of about 1,000. C.H.Ws.

WILBUR, RAY LYMAN (1875-), is a distinguished American educator. He was born in Boonesboro, Iowa, and was graduated from Stanford University. Later he studied medicine at Cooper Medical College in San Francisco and at various schools in Europe. In 1900 he began teaching physiology at Stanford. In 1911 he was named dean of the medical school and in 1916 he was elected president of the university. In 1943 he became chancellor. From 1929 to 1933 Wilbur was Secretary of the Interior under President Herbert Hoover. In this position he directed the building of Boulder Dam. E.W.KN.



Stanford University

Ray Lyman Wilbur, American college president who served as Secretary of the Interior



Brown Bros.

Ella Wheeler Wilcox, American poet.

WILCOX, ELLA WHEELER (1850-1919), was an American poet and journalist, best known for her *Poems of Passion*, published in 1883. She was born in Johnstown Center, Wis., and was educated at the University of Wisconsin. Her verse attracted attention because of its fluency and its frank treatment of subjects not generally discussed in American poetry at that time. L.U.

Her Works include *Poems of Pleasure*; *Poems of Sentiment*; *Poems of Progress*; and *Poems of Power*.

WILD, JONATHAN (1682-1725), was an English thief whose name has been preserved in English literature. He was a London buckle maker who turned thief and organized a band of robbers who stole for him. He also organized a company to dispose of the stolen goods. He was finally hanged. Daniel Defoe wrote a story about him in 1725, and Joseph Fielding satirized his career in *Jonathan Wild the Great*. P.V.B.J.

WILD ANIMAL. See ANIMAL.

WILD ASS. See ANIMAL (color plate, Europe and Central Asia); DONKEY.

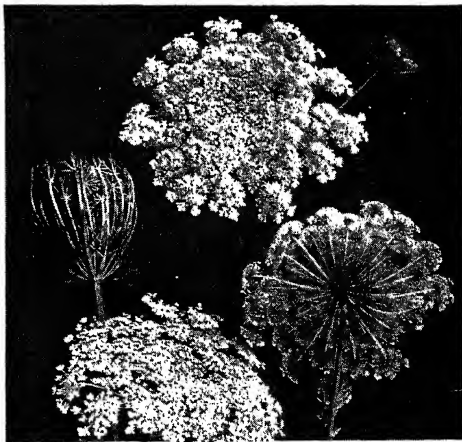
WILD BARLEY is a troublesome weed that belongs to the grass family. It grows in various parts of the North American continent. The plant has a slender, rounded stem which grows about two feet tall. The spikes of the flowers have a bristly beard around them. This beard somewhat resembles a squirrel's tail and therefore the name *squirreltail* has been given to wild barley. Wild barley is a pest because it grows very rapidly and kills off other plants. Also, the seeds of wild barley cling to the wool of sheep and irritate their hide. When animals eat the leaves and flowers of the plant, the leaves and flowers sometimes stick in their throats and cause them to choke. A fungus which grows on wild barley produces the poisonous drug ergot. This drug is dangerous to animals if they eat it. F.Th.

Classification. The botanical name of wild barley is *Hordeum jubatum*. It belongs to the family *Gramineae*.

WILD BOAR. See ANIMAL (color plate, Europe and Central Asia); BOAR, WILD.

WILD CANARY. See GOLDFINCH.

WILD CARROT, or QUEEN ANNE'S LACE. The cultivated carrot we eat is of European and Asiatic origin. In North America many carrot plants have "escaped" from the gardens and now grow wild as common weeds. The name "Queen Anne's lace" is given the plants because of their showy clusters of small white or yellowish flowers which grow in umbels, or umbrellalike clusters.



J. Horace McFarland

The Wild Carrot is well known to wild-flower lovers as Queen Anne's lace. Flower clusters are brilliant and showy.

The wild carrot is either an annual or a biennial, growing to three feet in height. It has thick yellow-orange roots like the domestic carrot, but the roots are not edible. The leaves are finely cut.

T.J.

Classification. Carrots are classed in the family *Umbelliferae* under the scientific name of *Daucus carota*.

WILDCAT is a name generally given to small, wild members of the cat family. The true wildcat lives in Europe. It is an extremely vicious animal, larger and stronger than the domestic cat. The true wildcat has yellowish fur and black streaks around the body, legs, and tail.

In North America, several species of lynx are called wildcats. The lynxes have longer bodies, longer legs, and shorter tails than domesticated cats. They prowl at night. Their ears have tufts of fur on them and their coats vary in color and thickness. The northern species of lynx has a long, clear-gray coat. The southwestern species is often called a *bobcat*. This animal has short, yellowish-brown fur, covered with dark spots and other markings.

There are many tropical species of wildcats. The most interesting is the Egyptian cat, which is said to be the ancestor of the house cat. Unlike other wildcats, the Egyptian cat has a long, slender tail. Its fur is yellowish and faintly striped on body, legs, and tail. It is sometimes called the *gloved cat* because its feet are black and look like gloves.

H.E.A.

See also BOBCAT; CAT; LYNX.

Classification. Wildcats belong to the family *Felidae*. The European species is *Felis catus*.

WILDCAT BANK. In United States history, wildcat banks were the unstable banking institutions which operated under state charters, particularly in the South, during the early and middle 1800's. These banks became especially numerous and irresponsible after President Andrew Jackson's successful struggle against the Second Bank of the United States. See JACKSON, ANDREW (Fight against the Bank).

The Bank of the United States had used its influence to restrain the state banks from issuing more paper money, or "wildcat currency," than their assets would justify. When Jackson succeeded in withdrawing government deposits from the Bank of the United States, his victory so crippled the Bank that it could no longer restrain the state banks. Many state banks, especially in the South and West, then issued unreasonably large amounts of paper money, which they lent freely on the flimsiest security.

As a result of this money inflation, there followed a period of wild speculation in Western land. The situation finally alarmed Jackson, who then issued his famous "Specie Circular," which ordered government agents to accept nothing but gold and silver in payment for public lands. In consequence, many of the wildcat banks were unable to meet the demands made on them and failed abruptly. These bank failures contributed to the serious financial panic which swept the country in 1837.

J.D.H.

WILD CELERY is another name for celgrass, a salt-water plant. See EELGRASS.

WILD DUCK. See BIRD (color plate, Wild Ducks); Duck (Wild Ducks).

WILDE, OSCAR (1854-1900), was one of the most colorful of English writers. It is difficult to determine how much of his fame is based on his writings and how much of it is based on the startling and unconventional manner of his life. But today many of the events of his life have been forgotten, while many of his works, particularly his witty plays, are still popular.



Brown Bros.

Oscar Wilde, British writer noted for his wit

Wilde, the son of a successful surgeon, was born in Dublin, Ireland. His mother was a fairly well known poet. Wilde studied at Trinity College at the University of Dublin, and at Magdalene College, Oxford University. At Oxford he started an aesthetic movement whose followers worshiped beauty and lived for art alone. The extreme manner in which they displayed their ideas attracted much unfavorable attention to them. Wilde was once thrown in a fishpond by unfriendly fellow students. But he appeared to like attention, no matter in what form.

In 1879 Wilde went to London. Here he continued to live an unconventional life. He attracted much attention, and his poses caused him to be caricatured in Gilbert and Sullivan's light opera *Patience* and in many magazines. In this period of his life, Wilde won the Newdigate prize for English verse, became a magazine contributor, and lectured for a year in the United States. Later he lived in Paris. Then he returned to London where he became a successful playwright. In 1895 Wilde was sentenced to prison for immorality. After he was released he went to live in France. Under the name of Sebastian Melmoth, he lived chiefly in Paris, where he died in poverty and disrepute.

G.E.B.

See also EPIGRAM.

His Works. Wilde's first published work was a book of poems, printed in 1881. Then he wrote two collections of fairy stories, *The Happy Prince* and *The House of Pomegranates*; a novel, *The Picture of Dorian Gray*; a one-act play in French, *Salomé*, which Sarah Bernhardt played in Paris; and a number of essays. His other plays include the witty society dramas *Lady Windermere's Fan*, *A Woman of No Importance*, *The Importance of Being Earnest*, and *An Ideal Husband*. "The Ballad of Reading Gaol" is often considered his greatest poem. *De Profundis* has been called "the biography of his soul."

WILDEBEEST. See GNU.

WILDER, LAURA INGALLS (1867-), is an American author who became a writer of books for children when she was sixty-five years old. She was born in Pepin, Wis., and settled near Mansfield, Mo., after her marriage. Her daughter Rose Wilder Lane (1887-) also became a well-known writer.

B.F.

Her Works include *By the Shores of Silver Lake*; *The Long Winter*; and *Those Happy Golden Years*.

WILDER, THORNTON NIVEN (1897-), is an American writer. He is perhaps best known for his experimental novels and plays. His first successful

novel, *The Bridge of San Luis Rey*, started a new sty of story in which the characters are brought together by mere chance. His play *Our Town*, which won the Pulitzer prize for drama in 1938, was presented without the use of scenery. His play *The Skin of Our Teeth*, which won the 1943 Pulitzer prize, was an experiment in the use of time in an unconventional fashion.



Thornton Wilder, author of popular novels and plays

Wilder was born in Madison, Wis., and spent his childhood in China where his father was a United States Consul. Later he studied at Oberlin College and Yale University. For a time he taught in private schools, and from 1930 to 1936 he lectured on literature at the University of Chicago.

S.M.S.

See also PULITZER PRIZES. His Works include the novels *The Woman of Andros* and *Heaven's My Destination*; and the plays *The Trumpet Shall Sound* and *The Merchant of Yonkers*.

WILDERNESS, BATTLE

OF THE. See WAR BETWEEN THE STATES (Principal Battles).

WILDERNESS ROAD. See BOONE, DANIEL; TRAILS OF EARLY DAYS.

WILDFIRE, another name for Greek Fire, hence the phrase, "to spread like wildfire." See GREEK FIRE.

WILD FLOWER. See FLOWER (Wild Flowers of North America; also the list of Related Subjects at the end of the article).

WILD FLOWER PRESERVATION SOCIETY OF AMERICA is an organization for saving American wild flowers from wasteful destruction. It has a number of chapters throughout the country, and headquarters at the New York Botanical Gardens in The Bronx, New York City.

WILD GERANIUM. See FLOWER (color plate, Woodland Flowers).

WILD GINGER. See GINGER.

WILD GOOSE. See BIRD (color plate, Wild Geese); CANADA GOOSE.

WILDLIFE CONSERVATION. Animal life has suffered as man has made progress. The clearing of forests, the draining of swamps, the damming of rivers, and other steps taken for the development of agriculture, mining, and industry have been of great benefit to civilization when these activities were wisely planned. But one of the bad results has been the disappearance of much wild animal life because of the destruction of their natural homes. The plump passenger pigeons which used to be abundant in the Eastern and Midwestern United States can no longer be seen anywhere, for the species is extinct. Only a few herds of buffalo remain, protected in national preserves and on private ranches. Today, most nations protect wildlife by laws which seek to preserve the useful species of land animal, bird, or fish.

Wildlife Conservation in the United States. A few people raised their voices in protest against the reckless destruction of America's animal life in the middle

1800's. But little of a practical nature was done for fifty years. California passed the first law for the creation of wildlife refuges in 1870. The Lake Merritt wild-fowl sanctuary, now in the city of Oakland, was established under this law. But no other state followed until 1903, when Indiana established its first wildlife refuge. The national park program was an early aid to the saving of wildlife. Yellowstone Park was created by an Act of Congress in 1872, and in 1894 the killing of all wildlife within the park was prohibited. The first Federal wildlife refuge was established by President Theodore Roosevelt at Pelican Island in Florida in 1903.

Between 1913 and 1925, wildlife refuges were established in twenty-four states. Some refuges selected in the early experimental years were later abandoned. But the idea of refuges became firmly established as a part of the American system of wildlife management. The first Federal refuge especially for big game animals was the national bison range, established on the Flathead Indian Reservation in Montana in 1909. In the same year the Olympic National Monument was set aside for the protection of the Roosevelt Elk. In 1938 this reservation became Olympic National Park.

The Migratory Bird Treaty Act of 1918 provided for the protection of birds migrating between the United States and Canada. The act also stimulated the establishment of bird refuges in both countries. Three bills passed by Congress in 1924, 1928, and 1929 established bird refuges on the upper Mississippi, at the mouth of the Bear River in Utah, and at Cedar Keys, Fla.

The wildlife conservation program made great strides during the administrations of Franklin D. Roosevelt. The establishment of the Civilian Conservation Corps in 1933 brought needed labor to many of the Federal and state wildlife refuges. The Works Progress Administration helped to create better Federal refuges. The United States Fish and Wildlife Service was established as a part of the Department of Interior in 1940. It took over the functions formerly vested in the United States Bureau of Fisheries and the United States Bureau of Biological Survey. While not directly aimed at wildlife conservation, broad water-power and reforestation programs like the Tennessee Valley Authority created improved conditions for all wildlife.

Federal and state wildlife conservation efforts have been aided by such organizations as the National Audubon Society, the American Ornithologists' Union, the Isaac Walton League, and the Boone and Crockett Club.

Types of Refuges. For the purposes of administration the Fish and Wildlife Service has classified wildlife refuges into four types.

Special-purpose refuges protect single colonies or groups of colonies of birds or mammals. Pelican Island, the first Federal refuge, is a good example of this type. Special refuges protect such birds as herons, ibis, gulls, terns, skimmers, auklets, murrelets, puffins, pelicans, fulmars, petrels, and cormorants.

Big-game refuges and game ranges provide forage and water for herds of big-game animals. Federal refuges now provide for one or more nucleus herds of bison, white-tailed and mule deer, elk, black-tailed deer, antelope, and mountain sheep. Animals not yet provided

for in the continental United States are the grizzly bear, moose, mountain goat, and caribou.

Migratory waterfowl refuges are combined land and water areas to meet the needs of waterfowl. Waterfowl refuges fall into three natural classes: (1) breeding areas; (2) resting and feeding areas, and (3) wintering grounds. All three are equally necessary to the welfare of the birds.

General wildlife refuges are made by closing an area to hunting, posting the boundaries carefully, and furnishing enough patrols to back up the warning signs. There are few Federal general wildlife refuges. Those on the Aleutian Islands and the Kentucky Woodlands National Wildlife Refuge are among the most important. General wildlife refuges are numerous in state conservation systems, and are often maintained by individuals. V.H.C.

See also AUDUBON SOCIETY, NATIONAL; CONSERVATION (Wildlife); GAME (with list).

WILD MORNING-GLORY. See BINDWEED.

WILD MUSTARD is any yellow-flowered weed of the mustard family. These are harmful weeds in many parts of the United States.

WILD PINK is a wild perennial herb of eastern North America. It has small rose or white flowers about an inch wide. The plant grows as high as nine inches and has notched petals. It blooms in spring and early summer, from April to June. The stem is erect, and tufted with sticky hairs. Wild pink is sometimes grown in gardens. It is easy to grow from seeds, divisions, or cuttings. See also FLOWER (color plate, Woodland Flowers). T.J.

Classification. Wild pink is known as *Silene pennsylvanica* and belongs to the family *Caryophyllaceae*.

WILD ROSE. See EGLANTINE; FLOWER (color plate, Flowers of Field and Roadside).

WILD TURKEY. See BIRD (color plate, Game Birds); TURKEY.

WILD WEST SHOW. See CODY, WILLIAM FREDERICK.

WILEY, HARVEY WASHINGTON (1844-1930), was an American chemist who campaigned against careless and dishonest practices connected with the adulteration and packaging of food. In 1906, largely because of his efforts, Congress passed the Pure Food and Drugs Act. Wiley was born in Kent, Ind., and was educated at Hanover College and the Medical College of Indiana. After he was graduated he taught chemistry at Purdue University. In 1883 he was appointed chief chemist of the United States Department of Agriculture. See also PURE FOOD AND DRUG LAWS. B.J.

WILEY COLLEGE is a coeducational school for Negroes at Marshall, Texas. It is controlled by the Methodist Church. Wiley College has departments of education, arts and sciences, commerce, music, home economics, and beauty culture. The college was founded in 1873. In 1948 Wiley was merged with Samuel Houston College at Austin, Texas. E.C.McL.

WILHELM. See WILLIAM (I, II, Germany).

WILHELMINA, *wil hel ME nah* (1880-), became queen of The Netherlands in 1890 when her father, William III, died. Her mother, Queen Emma, ruled as regent until Wilhelmina was formally crowned in 1898. Three years later she was married to Henry, Duke of Mecklenburg-Schwerin. They had one child, Juliana.

In May, 1940, when the Germans invaded The Netherlands, they tried to capture Wilhelmina. But she escaped with her government and set up a government in exile in England. There she directed the Dutch forces in the war against both Germany and Japan.

Wilhelmina became noted for her careful observance of The Netherlands' constitution, which strictly limits the royal power. She kept the loyalty of her people through her exile, and after the war returned to The Netherlands where she was warmly welcomed. In September, 1948, she gave up her throne in favor of her daughter Juliana. D.E.L.

See also JULIANA.

WILKES, CHARLES (1798-1877), was an American naval officer in the War between the States. He is chiefly noted for seizing the two Confederate envoys James Mason and John Slidell from the British mail steamer *Trent*. This act, known as the "Trent affair," aroused a storm of international protest. Wilkes was born in New York City and entered the navy at the age of twenty. In 1838 he commanded an exploring expedition in the Pacific Ocean and surveyed 1,600 miles of the coast of Antarctica. This territory was later named Wilkes Land. In 1866 Wilkes became a rear admiral on the retired list. See also TRENT AFFAIR. C.L.L.

WILKES-BARRE, WILKS bar ih, Pa. (population 86,236), is a railroad, manufacturing, and trading center in the rich hard-coal district of northeastern Pennsylvania. The city lies in the Wyoming Valley, on the east bank of the Susquehanna River, about 100 miles northwest of Philadelphia.

Wilkes-Barre manufactures include coal mine and railroad supplies, iron and steel products, silk goods and other textiles, locomotives, foodstuffs, tobacco, copper wire, and electrical goods.

The first settlement on the site of Wilkes-Barre was made in 1769 by colonists from Connecticut. It was named for John Wilkes and Isaac Barre, members of the British Parliament. These men took the colonial side of the quarrels between the colonists and the British government. Indian and British troops attacked the settlement and burned it in 1778. It was destroyed by fire again in 1784 during the fighting between Connecticut and Pennsylvania, known as the Pennamite-Yankee War. From this location, the expedition under General Sullivan moved north to punish the Indian tribes of the Six Nations in New York who had sided with the British. The route followed by Sullivan's forces is now known as the Sullivan Trail. Wilkes-Barre became a borough in 1818 and a city in 1871. R.O.H.

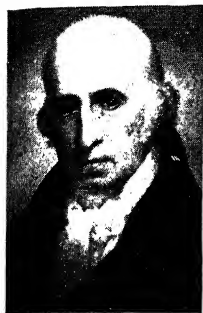
WILKIE, DAVID, SIR (1785-1841), was a Scottish painter. He is noted chiefly for his sentimental pictures of Scottish life. These paintings realistically express the spirit of the times. In later years he attempted historical



Netherlands Information Service
Queen Wilhelmina, beloved ruler of The Netherlands

pictures and portraits, but these were not so successful.

Wilkie was born in Cults, Fifeshire, and received his first art instruction at the Academy in Edinburgh. In 1805 he entered the Royal Academy at London and began to exhibit his paintings the following year. Wilkie was an immediate success. In 1809 he became an associate of the Royal Academy. In 1830 the king appointed him court painter. S.C.



Brown Bros.

Sir David Wilkie painted Scottish scenes.

His Works include "Card Players"; "Rent Day"; "Penny Wedding"; "Blind Man's Buff"; and "Chelsea Pensioners."

WILKINS, GEORGE HUBERT, SIR (1888-), is an

Australian explorer and aviator. In 1929 he sailed around the world in the dirigible *Graf Zeppelin*.

Wilkins was born at Mount Bryan East, in South Australia, and was educated in the Adelaide School of Mines. He was a restless young man and wanted to travel. In order to follow this ambition, he became an aerial photographer. In the war between Turkey and Bulgaria in 1912, he took the first motion pictures ever made of battle scenes.

In 1913 Wilkins became official photographer for the Vilhjalmur Stefansson Arctic expedition. When World War I broke out, Wilkins joined the Australian Flying Corps and fought in France. After the war he served as navigator of the Blackburn Kangaroo airplane in a flight from England to Australia. In 1920 he was second in command of an Antarctic expedition, and the following year served with another expedition. In 1928, after two unsuccessful attempts, he flew across the Arctic. Wilkins' flight was from Point Barrow, Alaska, to Spitsbergen, a distance of 2,200 miles. This flight was an unheard-of feat in that day.

That same year Wilkins led an expedition to the South Pole and explored the Antarctic by plane. In 1931 he set out to explore the Arctic by sailing under the ice pack of the Polar Sea in a submarine. Wilkins was only 400 miles from the North Pole when he was forced to turn back. Two years later he returned to exploration as a member of the Lincoln Ellsworth Antarctic Expedition. J. Cor.

See also POLAR EXPLORATION (Utilitarian Period).

WILKINS, MARY ELEANOR. See FREEMAN, MARY ELEANOR WILKINS.

WILKINSON, JAMES (1757-1823). See FRANKFORT Ky.).



U.S.N.

Sir Hubert Wilkins explored both the Arctic and the Antarctic.

WILL. In law, a will is an instrument, or document, which disposes of a person's property and which takes effect after the person's death. The person who makes the will is called the *testator*, if a man, and the *testatrix* if a woman.

It is best to have a will prepared by a lawyer in order to be sure that it effectively disposes of property and that it may not be successfully contested by persons who disagree with its terms. If there are different pieces of real estate going to different persons, each piece should be sufficiently described in the will to insure complete identification. Personal property should also be described.

A testator may dispose of his property in any way he chooses, so long as the disposal is not contrary to law. The will usually names some person as an *executor*. It is this person's duty to see that the wishes of the testator are carried out after his death. If no executor is named, the court which has jurisdiction over estates may appoint an *administrator*, whose duties are the same as those of an executor. The general rule is that every executor, even a close relative, must give a bond, or *surety*, for the faithful performance of his duties. If he does not faithfully carry out the provisions of the will, he forfeits the bond he has put up as evidence of his honesty. Generally, however, the bond may be waived if the will so provides.

Drawing a Will. A formal will prepared by a lawyer is desirable, but it is not absolutely necessary. In many states a person may, under certain circumstances, make an oral or *nuncupative* will which the courts will find acceptable. In a number of states the courts will accept the so-called *holographic* will, written in the testator's own handwriting and unwitnessed.

It is best not to rely on these special forms, since in some cases they may leave the will open to a successful contest. A will should be in writing, signed by the testator and three witnesses. Any person may write his own will in simple everyday language and it will meet all legal requirements if the provisions are so plain that they cannot be misunderstood. The following is an example of a simple form of will that will be accepted by all courts.

I, Melville E. Strom, do make this my last will as follows:

All my estate, both real and personal, which I leave, I devise and bequeath to my wife, Dorothy L. Strom, for her own use and benefit forever, and I hereby appoint her my executrix, without bond, with full power to sell, mortgage, lease, or in any other manner to deal with or dispose of the whole or any part of my estate.

Executed at Chicago, Illinois, January 10, 1948.

Melville E. Strom (seal)

The foregoing instrument was in our presence, signed and sealed by the said Melville E. Strom, at the end thereof, and by him published and declared as and for his last will, and at his request and in his presence and in the presence of one another, we hereunto subscribe our names as attesting witnesses, at Chicago, Illinois, on January 10, 1948.

James Doe

Paul W. Morris

John J. Jones

5137 East Ave.,
Chicago, Illinois
4760 West Ave.,
Chicago, Illinois
6808 South Blvd.,
Chicago, Illinois

The witnesses should not be persons who are named in the will. It is advisable that they be friends of the testator, so that they can be readily located at a future date. For this reason it is important to have the address of each of the witnesses at the time the will is signed.

A *codicil* is an addition made after the will has been prepared, changing or modifying the will in some way. A will may be altered or destroyed by the testator at any time. Such alteration will be legal, provided the testator is of sound mind and that proof is available to show that the alteration was not caused by undue influence from parties interested in the change.

Each state of the Union and each province of Canada has its own laws governing in detail the execution of wills.

R.F.B.

See also CODICIL; EXECUTOR; INTESTACY; LEGACY; PROBATE.

WILL, in psychology, is that form of mental activity which is concerned with choice and action. The will is sometimes called the *motor element in ideas*. Many psychologists believe that without the power of will, no thought can be translated into action. Another group of psychologists holds that there are certain so-called *free actions* which result from no specific act of will and from no deliberate choice of action. The first group believes that a deliberate act is made up of four steps: desire, deliberation, choice, and action. Every choice is based on a certain amount of desire and deliberation. Each choice must lead to some action or it might as well not have been made.

The essence of will is *motivation*. Where there is no motive there is no will. A person must have a desire or a want, before he can will, so that he will have a goal toward which he is directing his will and his action. A choice or decision cannot be made without a reason. Choice may be based on imitation, or on suggestion. Inhibition by negation or by substitution may affect a choice or decision.

Frustration and unhappiness are the chief conditions for *willing something*. Satisfaction eliminates the will, because satisfied persons have no strong motivation for action. The greatest achievers of the past have been frustrated people. The frustrated person has been put out of equilibrium, and is deeply dissatisfied.

The will acts on the principle of returning a system of energy to equilibrium. The will allows the frustrated person to return to a state of equilibrium by giving his energies a new direction until he has the satisfaction of accomplishing a new aim in life. The will, therefore, is an act of resolving a tension, which means the achievement through effort of a purpose or goal.

For many years arguments have raged between those persons who believe in free will and those who believe in the doctrine of predestination. See FREE WILL; PREDESTINATION.

R.H.WHE.

WILLAMETTE, with *LAM* et, **RIVER**. This stream rises in the Cascade Mountains of west-central Oregon. It flows northward for about 250 miles, and empties into the Columbia River through a level valley which is about sixty miles wide. The Willamette Valley is the richest farming area in Oregon. The Willamette River can be sailed up its natural channel for twelve miles to Portland, which is the largest city in Oregon. A canal

around Willamette Falls allows small steamers to go up the river to Eugene, 125 miles from Portland. L.D.JR.

WILLAMETTE UNIVERSITY is a coeducational school at Salem, Ore. It is associated with the Methodist Church. The university has colleges of liberal arts, law, and music. Willamette was founded in 1842, and has an average enrollment of about 800.

G.H.SW.

WILLARD, EMMA HART (1787-1870), was an American educator. Her efforts toward higher education of



Mayne Davis

Emma Willard worked to increase educational facilities for American women.

women greatly advanced that movement in the United States. She also wrote a volume of poems which included *Rocked in the Cradle of the Deep*. She was born in Berlin, Conn., where she began to teach school at the age of sixteen. In 1809 she was married to John Willard, who helped her to establish a girls' boarding school at Middlebury, Vt. Later she founded a girls' seminary at Watertown, N.Y. It was later moved to Troy, N.Y., where it became famous as the Emma Willard School. She used the proceeds from her many books to found a school for women in Athens, Greece.

E.W.KN.

WILLARD, FRANCES ELIZABETH CAROLINE (1839-1898), was an American educator and social reformer. She was a leader in the Woman's Christian Temperance Union, and did more for the cause of temperance than any other one person of her time.

She was born at Churchville, N.Y., and was graduated from Northwestern Female College, Evanston, Ill. After teaching for several years, in 1871 she was appointed president and professor of aesthetics of Evanston College for Ladies, which in 1873 became part of Northwestern University. She resigned in 1874 to become national corresponding secretary of the Woman's Christian Temperance Union. Five years later she was chosen national president, and was re-elected every year until her death.



Brown Bros.

Frances E. Willard, American temperance worker

Frances E. Willard became a member of the executive committee of the Prohibition party in 1882. In 1887 she was elected president of the World Woman's Christian Temperance Union, which she had founded in 1883. She devoted much of her time to lecturing, and supported woman suffrage.

In addition to the work of administering the W.C.T.U., she served as president of the National Council of Women, and vice-president of the Universal Peace Union and of the Association for the Advancement of Women.

The state of Illinois presented her statue to Statuary Hall in Washington, D.C., in 1905. She was the first woman to be so honored.

R.M.B.

See also STATUARY HALL; WOMAN'S CHRISTIAN TEMPERANCE UNION.

WILLARD, JESS. See BOXING.

WILLEMITE, WIL *em ite*. See ZINC.

WILLET is a fairly large shore bird of North and South America. It is related to the sandpipers and snipes. The willet is often called the *duck snipe*, and has ten or more other common names. It breeds along the Atlantic Coast between Virginia and the Bahama Islands, and migrates in winter as far south as Peru. It is sometimes seen in Europe.

The willet is about sixteen inches long, colored light gray or white below and dark gray above. Its extended wings are strikingly marked with black and white. Its bill is quite long, and is straight and slender. The bird makes its nest in a clump of weeds or grass in marshes close to the shore. The female lays four greenish-white or brownish-olive eggs. These eggs are speckled with brown and purple.

L.A.Ha.

Classification. The eastern willet is *Catoptrophorus semipalmatus semipalmatus* in the *Scopolacidae* family. The western willet is *Catoptrophorus semipalmatus inornatus*. It inhabits western North America from Manitoba to Texas, and occurs rarely in Florida and South Carolina.

WILLIAM was the name of four kings of England.

William I, the Conqueror (1027-1087), was the first Norman king of England. He was the son of Duke Robert I of Normandy and inherited the duchy of Normandy at the age of eight. Because of his youth he could not govern well, and for a long time the territory was in wild disorder. But at the age of twenty he put down a serious revolt and from that time on he ruled with an iron hand.

In 1051 William visited England. He later claimed that on this visit Edward the Confessor promised that William would follow him on the English throne. In 1063 Harold, Edward's brother-in-law, was shipwrecked on the Norman coast and taken prisoner. In return for his freedom, he promised to support William's claim to the throne. But three years later, when Edward died, Harold proclaimed himself king.

William immediately invaded England to make himself king. He made the daring voyage with about 5,000 men, half of whom were knights with their horses, in small open boats. The Pope approved of William's claim, and the Normans carried a banner blessed by him. Harold was ready to attack the Normans, but a Norwegian invasion at the same time drew him away. He returned after the Normans had landed and was defeated and killed at the Battle of Hastings.

William was crowned king soon afterward, but it took several years for him to conquer the country completely. He punished all who resisted him by taking their lands and giving them to his followers. But he accepted the friendship of those who promised him their loyalty. William strengthened his hold on the country by keeping most of the original Saxon laws and customs. He did not cut up the country in the usual feudal system of powerful duchies. Instead he made all landholders swear loyalty directly to him. In this way he had no powerful dukes to oppose him. For a time William had difficulty with Scotland, and the king of Scotland encouraged many English nobles to rebel against him. But in 1072 William invaded Scotland and forced the Scottish king to swear allegiance to him.

William was a wise king and ruled England well. Early in his reign he ordered a census taken, and the names



Historical Pictures

William the Conqueror Landing on the English Shore

of the principal landholders were written in the Domesday Book. The people respected him. He was a man of temperance and devout religion in an age of wickedness. William and the Norman nobles brought French polish and delicacy to the rough Anglo-Saxons. Their influence can be seen in many ways, especially in the number of words of French origin in the English language. See also HAROLD (II, England); HASTINGS, BATTLE OF; NORMAN CONQUEST.

William II (about 1056-1100) was the son of William I. He was called Rufus, meaning *red*, because of his red face. William was a capable but unpopular king. The monks who wrote the history of his time portrayed him as a cruel tyrant.

William became king in 1087. In the first year of his reign several powerful Norman barons revolted. But enough nobles remained loyal to give William the power to put down the revolt and strengthen his position. He was ambitious for conquest and brought Normandy, which his brother Robert ruled, under his control. William invaded Scotland and secured a firm hold on Cumberland and Westmoreland.

His reign was also noted for his bitter quarrel with the Roman Catholic Church. In 1089, when the Archbishop of Canterbury died, William refused to appoint another archbishop. He allowed the great see of Canterbury to stand vacant for several years and kept the church money for himself. In 1093, ill and frightened, he appointed Anselm to this position, but later forced him to leave England. William was assassinated while hunting in the New Forest, and the clergy refused to give him a church funeral.

P.V.B.J.

William III (1650-1702), known as WILLIAM OF ORANGE, was king of England, Scotland, and Ireland. He was born in The Hague, the son of the Prince of Orange. William's mother was Mary, the daughter of Charles I of England. The young man gained fame early by his opposition to Louis XIV of France.

In 1672, when Louis invaded Holland, the Dutch chose William to be their ruler. Time and again William was defeated, but he always managed to keep the French from advancing. Once he was forced to open the dikes.

The French were stopped for a while, and William had time to build up an alliance against them. In 1677 he married Mary, daughter of James, Duke of York, later James II of England. William hoped to gain the support of England and became friendly with the parties who

were opposed to the Roman Catholic King James. The king's only son became a Catholic, and the Protestants of England looked with favor on William and his wife Mary. Both were related to English kings, and both were Protestants. The leaders of both political parties invited William and Mary to become joint rulers of England.

In 1688 William landed in England with an army of 14,000 men. Not a drop of blood was shed in the "Glorious Revolution" that followed. James escaped to France, and two years later led a French army to Ireland. Here William defeated James and his Irish allies in the Battle of the Boyne. The Protestants of Ulster supported William, and to this day they are still called *Orangemen*.

William was one of the ablest of English kings, but was not very popular. The people never understood his foreign ways and he never understood the English political system. William allowed Parliament to limit his power in order to gain their support in his fight against the French king.

William proved to be both a good soldier and a clever diplomat in his struggle against Louis XIV. In 1692 his admirals destroyed the French sea power and his generals were successful on land. In 1701 he formed an alliance with nearly all Europe against Louis, but did not live to fight in the war which followed. See *BILL OF RIGHTS*; *BOYNE, BATTLE OF THE*; *FURNITURE (William and Mary)*; *JAMES (II, England)*.

William IV (1765-1837) was known as "the Sailor King" because of his early career in the navy. In 1830 he followed his brother, George IV, to the throne. William was a good-natured but not very clever king, and was often called "Silly Billy." He often opposed the measures of his Prime Ministers. Three of the greatest of English reforms, the Reform Bill of 1832, abolition of slavery in the colonies, and factory reform, were passed against his wishes. William's niece, Victoria, followed him to the throne.

P.K.N.

WILLIAM, WIL *iam*, in German, *WILHELM, VIL helm*, was the name of two German emperors.

William I (1797-1888) was king of Prussia and the first emperor of modern Germany. He was born in Berlin, the second son of Frederick William III, king of Prussia. William received military training in his early youth and in 1814 and 1815 he fought against Napoleon of France.

During the revolution of 1848 William became very unpopular because he opposed constitutional reform. He was forced to leave the country, but he returned soon afterward with his army and put down the uprising in Baden. In 1858 he became regent for his brother, Frederick William IV, and three years later was proclaimed king of Prussia. William was a firm believer in the divine right of kings, but gave control of the govern-

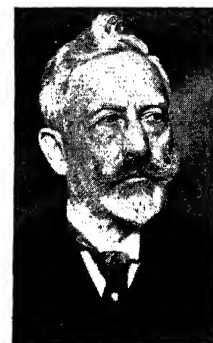
ment to his advisers. He trusted his Prime Minister, Otto von Bismarck, and supported Bismarck's policies even when they meant war. William led the armed forces in the three wars Bismarck brought about in the process of unifying Germany. During the last days of the Franco-German War in 1871, Bismarck completed his great task. William was proclaimed emperor, or Kaiser, of a united Germany.

William II (1859-1941) was the last emperor of Germany. He was also the last of the Hohenzollern kings which had ruled Prussia since 1701.

William was the Kaiser of World War I. For a long time people believed him to be solely to blame for this war. But today historians believe that Austria and Russia were about equally guilty in bringing on the conflict.

William, the grandson of William I, was born in Berlin. He was the eldest son of Frederick III and Princess Victoria of England. George V of England and Nicholas II of Russia, who later fought against him, were his cousins. The young prince received an education with an emphasis on military training. His service in the army made him friendly with the aristocratic military class. William was a cripple with a paralyzed left arm, but he hid his weakness by playing the strong man. When he came to the throne in 1888, after the hundred-day reign of his father, his ideas had important results.

Bismarck was still Chancellor and Prime Minister when William was crowned. But the proud young emperor soon got rid of him. He wanted to be the most powerful figure in Germany in fact as well as in name. His prime ministers were unimportant figures who served only to carry out his will.

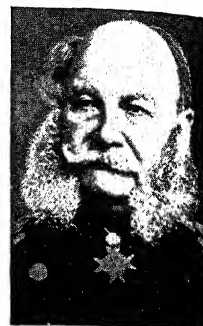


U&U

William II lost his throne in World War I.

Under William's nervous will, Germany prospered. He encouraged manufacturing, trade, and commerce; and Germany continued, as she had since 1871, to turn from an agricultural into an industrial country. Germany needed a world market for its new commerce, and William adopted a policy of colonial expansion. He added some regions of east and southwest Africa to the empire, and also gained a foothold in China and the Pacific islands. These colonies had to be guarded, so the emperor increased the size of the German navy. In the meantime he built up his beloved army until it was the greatest military machine the world had ever seen.

William's foreign policy was an aggressive one, and many times he "rattled the saber." He believed that he could frighten the world by a display of power. His colonial interests and his naval program made him the natural enemy of Great Britain. William began to feel that Germany was being encircled by enemies. In 1890 he broke the old Prussian and German alliance with Russia, which was one of the bases of Bismarck's policy. By doing this, William forced the Russians to make an alliance with France. Several times his forceful policy



U&U

William I, the first emperor of modern Germany



Brown Bros.

William III became king of England in the "Glorious Revolution."

brought the European countries to the brink of warfare. When war did come in 1914, William was certain that Germany would win, and he did not follow the struggle very closely. During the last two years of the war the Allied blockade began to make itself felt, and the German people suffered from hunger.

Finally on about November 1, 1918, several revolts broke out and the German navy mutinied. On November 7, the Prime Minister, Prince Max of Baden, demanded that William give up his throne. The emperor refused and remained with his armies, hoping for their support. But Field Marshal Paul von Hindenburg did not support him in the critical moment, and two days later William sought refuge in the neutral Netherlands. Here the former emperor lived for more than twenty years in comfortable exile in Doorn. He married a second time, and received forty million dollars from the German Republic, while a new and revengeful Germany arose to threaten the world again. He hailed Hitler, and some of his sons became active Nazis.

E.L.V.

Related Subjects. The reader is also referred to:

Bismarck-Schönhausen	Germany; Germany in
Divine Right of Kings	World War I)
Franco-German War	Hohenzollern (History)
Germany (Unification	Seven Weeks' War
of Germany; United	

WILLIAM I (1772-1844) was the first king of the modern state of The Netherlands. He was the son of William V, Prince of Orange, the last stadholder of Holland, who lost his throne to the French in 1795. William I joined the Prussian army in the battle against Napoleon, and in 1806 lost his family's German duchy of Nassau. Seven years later he regained Nassau, but traded it for the duchy of Luxemburg in 1815 in the general settlement at the Congress of Vienna. The Congress also made William I king of the new state of The Netherlands which then included Belgium and Luxemburg. In 1830 Belgium demanded separation from The Netherlands. After years of strife William finally agreed. Belgium became an independent state in 1839. The following year, because of internal difficulties, William I gave up the throne of The Netherlands in favor of his son William II.

A.R.-Jr.

WILLIAM I, PRINCE OF ORANGE (1533-1584) was the father of the Dutch Republic. He was called William the Silent because of his quiet, cautious nature.



Brown Bros.

William I, Prince of Orange, helped found the Dutch Republic.

William was born in Dillenburgh. His parents were Lutherans, but the Emperor Charles V liked him and asked that he become a Roman Catholic, which he did. In 1548 Charles made him his page. In 1555 he gave William command of troops on the frontier of France.

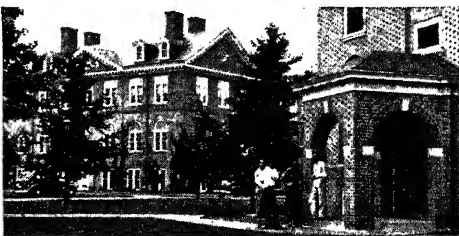
Charles gave the Spanish throne to Philip II in 1556. He hated William and tried to increase Spain's control of Holland. William tried to make the rights and privileges of the Dutch secure.

When Philip tried to stamp out the Protestants, William sided with them and returned to Lutheranism. In 1568 he led a revolt against Spain, but was defeated several times. In 1576 he per-

sued the northern and southern provinces to join him and they succeeded in breaking away from Spain. Three years later the seven provinces of the North formed a league which later became the Dutch Republic. In 1581 Philip put a price on William's head, and three years later finally had him murdered.

D.E.I.

WILLIAM AND MARY, COLLEGE OF, is a state-supported coeducational school of liberal arts at Williamsburg, Va. It is the second oldest college in the United States, and had its beginnings in Henricopolis University, the first college in the United States. Henricopolis was founded in 1617, but had to suspend as a result of the Indian massacres of 1622. In 1693 the school was re-established through a charter and funds granted by



Hefferman, Gendreau

Dormitories of College of William and Mary

King William and Queen Mary, and the school took the name of the royal couple. The college also received a grant of 20,000 acres of land from the Virginia colony. It still pays the governor of Virginia for this land with two Latin verses each year.

The college still has many of its old Colonial style buildings. Both the old and the new buildings fit well into the colonial atmosphere of Williamsburg. All the students live in college residences. Enrollment is limited to 1,300 students, of which 40 per cent may be women.

William and Mary lists many famous Americans among its former students. These include Thomas Jefferson, James Monroe, John Tyler, and Benjamin Harrison. Phi Beta Kappa, the scholastic honorary society, was founded here, as was the honor system, which is one of William and Mary's proudest traditions.

The college's liberal arts course leads to a B.A. degree. M.A. and B.C.L. degrees are also granted. The college operates a junior college at Norfolk, Va., and the Richmond (Va.) Professional Institute.

G.B.G.

See also PHI BETA KAPPA.

WILLIAM JEWELL COLLEGE is a coeducational school of liberal arts at Liberty, Mo. It is connected with the Baptist Church. The college was founded in 1849, and has an average enrollment of about 500.

WILLIAM OF WIED (1876-). See ALBANIA (As an Independent Nation).

WILLIAMS, BEN AMES (1889-), is an American novelist and short-story writer. His books include detective stories, character studies, and realistic stories of life in Maine. He was born in Macon, Miss., and was graduated from Dartmouth College. In 1910 he became a reporter on the Boston *American*. Shortly afterward he started writing short stories.

L.C.Wt.

His Works include the novels *Come Spring*; *Splendor*; *The Strange Woman*; *Leave Her to Heaven*; and *Time of Peace*.

WILLIAMS, BERT (1876?-1922). See NEGRO (Negro Contributions to American Life [The Stage]).

WILLIAMS, DANIEL HALE (1858-1931), was a distinguished American Negro surgeon. In 1891 he organized the Provident Hospital in Chicago, which was one of the first institutions to train Negro interns and nurses. Williams was the only Negro charter member of the American College of Surgeons. His surgical closing of a wound of the heart in 1893 is believed to have been the first successful operation of its kind.

WILLIAMS, EPHRAIM (1714-1755), was an American colonial army officer. After his death in battle against the Indians, part of his estate was used to found Williams College. See also WILLIAMS COLLEGE.

WILLIAMS, GAAR (1880-1935), was an American cartoonist. His series of cartoons had such titles as "Among the Folks in History," "A Strain on the Family Tie," "Wotta Life!" "How To Keep from Growing Old," and "Something Ought to Be Done about This." They became famous during the fourteen years he drew them for the Chicago Tribune-New York Daily News Syndicate. Williams was born in Richmond, Ind., and received his art training at the Cincinnati Art Museum and the Art Institute of Chicago. After several successful years as a political cartoonist in Chicago and Indianapolis, he turned his entire attention to humorous cartoons.

H.B.O.

WILLIAMS, GEORGE, SIR (1821-1905). See YOUNG MEN'S CHRISTIAN ASSOCIATION.

WILLIAMS, GLUYAS. See CARTOON (Leading Cartoonists).

WILLIAMS, RALPH VAUGHAN. See VAUGHAN WILLIAMS, RALPH.

WILLIAMS, ROGER (1603?-1683?), was a clergyman who founded the colony of Rhode Island in America. Historians today consider him one of the greatest of American colonial statesmen. His Rhode Island colony was the first truly democratic state of modern times. It served as a model for the later Americans who established the United States of America. Williams was also a strong believer in religious freedom. He deserves much of the credit for bringing about the separation of church and state in the United States.

Williams was born in London and was educated at the Charterhouse School and Pembroke College, Cambridge University. He became a Puritan at an early age, and by 1629 was ordained a minister. But Williams' sermons in favor of religious tolerance and liberty were not popular, and he had to flee from England to avoid arrest.

In 1631 Williams landed in Boston with his wife. He was soon offered the position of Teacher in the Boston Church. But Williams refused this offer because the church was associated with the Church of England. He also accused the Boston Church of controlling civil affairs and of not permitting freedom of worship. Williams went to Salem and joined the church there, but later moved to Plymouth when the civil authorities objected to his preachings. Here he became friendly with the Indians and learned their language.

In 1633 he returned to Salem as Chief Teacher in the church there. In this position he made himself very un-



Roger Williams' Great Friendship with the Indians Aided in the Establishment of the Rhode

Chitown Hist. Soc.



F. S. Lincoln

Garden of the Governor's Palace in Williamsburg, Va., is a good example of landscaping. The trees, hedges, and shrubs

are clipped to give the garden a formal appearance. The garden lies back of the governor's stately mansion.

popular with the Massachusetts Bay Company and the governing class of people. Williams accused them of not paying the Indians for the lands they had taken. He was tried for heresy and sentenced to be returned to England, but he escaped. Williams spent the cold winter in several Indian camps. Here he made himself loved and trusted by settling disagreements between different tribes. Other men who had been banished from the Massachusetts colony joined him.

In 1636 Williams founded the town of Providence, now capital of Rhode Island, on land which the Narragansett Indians gave him. This settlement was the world's first government in which all men had an equal voice in state affairs. Williams founded the settlement on the principle of freedom of worship and separation of church and state. The church was to have no part in civil affairs. Other near-by settlements joined, and Rhode Island became a colony. Williams went to England in 1643 and obtained a charter for the colony. In 1654 he became president of the colony and served three terms. Williams devoted his life to guiding the democratic principles of Rhode Island. Under Williams the colony became a haven for those colonists of New England who were hated and persecuted. His many pamphlets and letters, as well as his work on the first institutions of Rhode Island, had great influence on the founders of the United States. J.E.

See also BAPTIST; RHODE ISLAND (History); STATUARY HALL.

WILLIAMS, TENNESSEE (1914-), is an American

playwright. His drama *The Glass Menagerie* won the New York Drama Critics' Circle award and the Sidney Howard Memorial Award of \$1,500 in 1945. Williams was born in Columbus, Miss. His name was originally Thomas Lanier Williams, but he chose Tennessee Williams as a pen name. He was educated at the universities of Missouri, Iowa, and Washington, and began writing while supporting himself doing various odd jobs. His group of four one-act plays called *American Blues* won a Group Theater prize in 1939. B.M.

WILLIAMSBURG, Va. (population 3,942). This historic Virginia city is located on a ridge of the Virginia Peninsula, seven miles from Jamestown on the James River and twelve miles from Yorktown on the York River.

Early History. In 1699 the capital was moved from Jamestown to Middle Plantation, later renamed Williamsburg after King William of England. Williamsburg was the capital of the Virginia Colony from 1699 to 1776, and of the independent commonwealth of Virginia from 1776 to 1799. The College of William and Mary, the second oldest college in America, was founded in 1693. Patrick Henry delivered his famous speech against the Stamp Act in the Capitol building at Williamsburg. The same building was the scene of the convention of 1776 which instructed Virginia delegates to the Continental Congress to declare for independence. This convention also drafted the Virginia Declaration of Rights, which became the model for the Bill of Rights in the United States Constitution. During colonial days,

Williamsburg was the center of Virginia social, cultural, and political life. Visitors from England favorably compared the elegance of the town's social season to that of London.

The Decline of Williamsburg. In 1779 the capital of Virginia was moved to Richmond because the movement of population westward made a more central location desirable. Williamsburg lost much of its colonial charm as modern structures and manners gradually replaced the old. During the War between the States, the city was occupied by Federal troops. During both World Wars, Williamsburg was the center of an important military area. But for more than a hundred years, Williamsburg lived on little more than its memories.

Restoration. In 1927 the Reverend W. A. R. Goodwin of Williamsburg interested John D. Rockefeller, Jr., in restoring the city to the way it had looked in the 1700's. Many buildings were torn down. More than three hundred colonial type homes were restored or rebuilt on the basis of authentic information from documents and records found in museums and libraries. Today, even the shops in the business district are copies of colonial architecture. The Williamsburg Restoration has made the city a favorite spot for tourists. Many thousands of visitors each year are guided through the historic buildings and gardens which portray the life and customs of the 18th century. The motto of colonial Williamsburg is: "That the future may learn from the past."

J.E.P.

See also UNITED STATES OF AMERICA (color plate, Historic American Buildings [Governor's Palace]).

WILLIAMS COLLEGE is a privately controlled liberal arts school for men at Williamstown, Mass. It operates the Hopkins Observatory, which was built in 1828 and is the oldest college astronomical observatory in the United States. In 1835 Williams College became the first American college to conduct a scientific expedition. It sent a research group to Nova Scotia. The college was founded in 1793 and has an average enrollment of about 850.

WILLIAM SMITH COLLEGE. See **SENECA, COLLEGES OF THE.**

WILLIAMSPORT, Pa. (population 44,355), is an important manufacturing and trading center in north-central Pennsylvania. Williamsport lies on the north bank of the West Branch of the Susquehanna River. The three chief manufactures of Williamsport are metal products; silk, rayon, and other textiles; and leather goods. Until the 1870's, Williamsport was the center of the lumbering industry in Pennsylvania. There are still a number of planing mills and furniture factories in the city. Williamsport was founded in 1795. It became a borough in 1806, and was incorporated as a city in 1866.

R.O.H.

WILLIAM THE CONQUEROR. See **WILLIAM (I, England).**

WILLIAM THE SILENT. See **WILLIAM I, PRINCE OF ORANGE.**

WILLIMANTIC, Conn. (population 12,101), is often called "The Thread City" because it is one of the leading thread and yarn-spinning centers of the United States. Willimantic is situated on the Willimantic River in the hilly uplands of eastern Connecticut. In-

dustries of the city include the manufacture of textiles, paper, iron products, printing machinery, and parts for aircraft, radio, and radar equipment. Willimantic was incorporated as a borough in 1833 and as a city in 1893. It is the home of Willimantic State Teachers College.

G.E.F.

WILLINGTON, FREEMAN FREEMAN-THOMAS, MARQUIS OF (1866-1941), was Governor-General of Canada from 1926 to 1931. During the next five years he was Viceroy and Governor-General of India.

WILLIS, NATHANIEL PARKER (1806-1867), was an American poet, journalist, and editor. He was one of the outstanding literary figures of his time and was noted for his polished articles on the social life of New York City. Willis was born in Portland, Me., and was educated at Yale College. In 1827 he entered journalism and two years later founded the *American Monthly Magazine*. In 1831 he gave up this publication and went to Europe as correspondent for the *New York Mirror*. In 1846, with George Pope Morris, he became joint owner of the highly successful *Home Journal* to which he contributed weekly letters, poems, and stories. During the War between the States he served as the *Home Journal's* correspondent.

T.R.H.

His Works include *Pencilings By the Way* and *People I Have Met*.

WILLKIE, WENDELL LEWIS (1892-1944), was the Republican candidate for President of the United States in 1940 when Franklin D. Roosevelt ran for a third term. Willkie was defeated, but he polled more than 22,000,000 votes.

His political career was one of the most unusual in American history. Most of his life he had been a loyal



Harris & Ewing

Wendell L. Willkie led the Republican party in 1940.

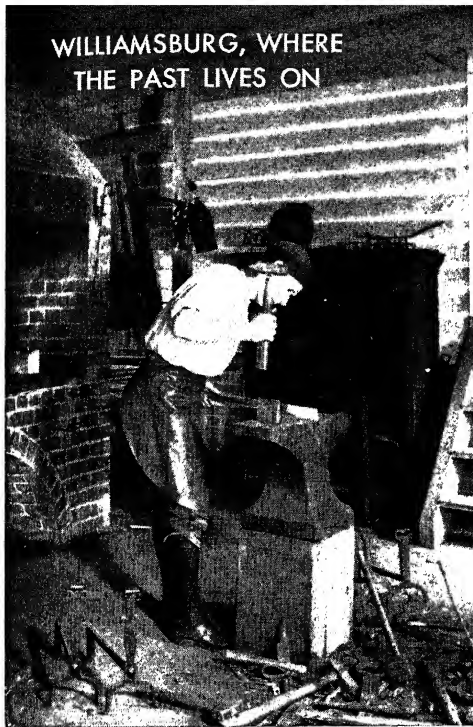
member of the Democratic party, but he became a Republican in the middle 1930's. He rose to political prominence without the aid of a regular political machine, and most of his advisers were political amateurs. The chant "We want Willkie" from the galleries at the Republican National Convention forced many unwilling regular Republican leaders to give him the nomination.

Willkie was born in Elwood, Ind. His first name was originally Lewis and his middle name Wendell.

But when he enlisted in the army during World War I, the army mistakenly reversed them and he accepted the change. He studied law at Indiana University, and later practiced law in Akron, Ohio, and in New York City.

In 1929 he became legal adviser to the Commonwealth and Southern Electric Utilities Company. Four years later he was elected the company's president. He fought a long legal battle against the Tennessee Valley Authority. But when in 1939 the United States Supreme Court refused to consider the question of the consti-

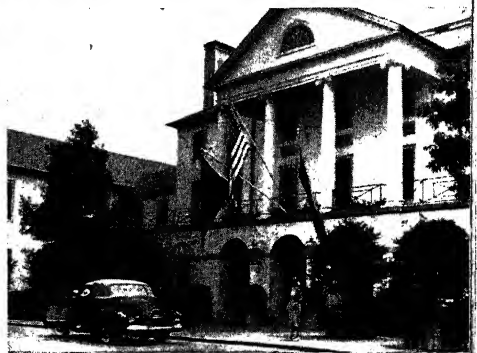
WILLIAMSBURG, WHERE THE PAST LIVES ON



The Blacksmith of Williamsburg, dressed in colonial style, works at his anvil in the Deane Smithy.



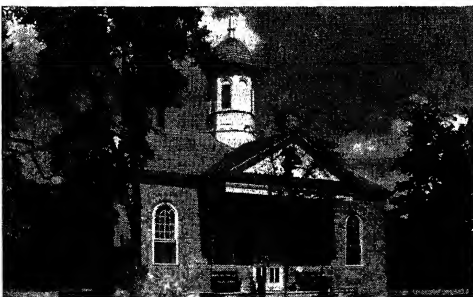
The Old General Store has been restored. It looks today as it did when it was built before the American Revolution.



Williamsburg Inn is a popular stopping place for the thousands who visit the colonial town each year.



The Thick-walled Powder Magazine was built in 1714 by Governor Alexander Spotswood of Virginia.



The Williamsburg Courthouse, built in 1770 and restored in 1932, now houses the town's historical restoration exhibit.



Photos: Gendreau; H. Armstrong Roberts; Daniel, Pix

Hostesses in Colonial Costume, who greet visitors, travel about the town by horse-drawn coach.

tutionality of its activities, he sold the properties of the Tennessee Electric Power Company, a subsidiary of Commonwealth and Southern, to the T.V.A. for \$78,000,000.

As a businessman, Willkie became prominent for his opposition to the New Deal of President Roosevelt. In connection with his campaign for President, he wrote *We the People*, which outlined his political beliefs. He favored many of the New Deal's social reforms, but opposed many of its regulations of business. He favored removing controls and changing the tax system to encourage business expansion. But he largely agreed with Roosevelt's foreign policy.

After the United States entered World War II, Willkie rallied his followers in a program of national unity. Roosevelt sent him on a number of visits to foreign countries as his unofficial envoy. On his return from a trip in 1942, Willkie wrote the book *One World*. In it he outlined his ideas for international co-operation. Willkie entered the Wisconsin spring primaries of 1944 as a candidate for the Republican nomination for President. He was defeated and announced his retirement from politics.

W.S.E.

WILL-O'-THE-WISP. See IGNIS FATUUS.

WILLOUGHBY, WILL oh bih, HUGH, SIR (? -1554).

See EXPLORATION AND DISCOVERY (Table of Famous Explorers).

WILLOW is the name given to a group of trees and shrubs which grow in almost all parts of the world. Willows less than an inch tall grow in the Arctic regions on high mountains. These tiny willows are the only "trees" the Eskimos ever see. Other willows in temperate regions of North America sometimes reach a height of 140 feet.

Willows usually grow near water. Their roots, branches, and wood all bend easily. Because the wood is so pliable, willow branches and twigs are very useful

in making baskets and wicker furniture. The flowers are borne in small furry *catkins* which appear on the branches before the leaves come out. Before the leaves are fully developed, the small flask-shaped fruits split open and let out tiny, downy seeds. The white, silky hairs on the seeds allow them to ride the wind, and they are blown far and wide. The stamens and pistils are on separate trees, and the willows are pollinated principally by insects such as the honey bee, which uses the pollen for feeding the young larvae. The roots interlace underneath the ground, and form a strong network.



L. W. Brownell

Leaves of the Black Willow

Willows planted on a riverbank are a good protection against soil erosion.

A typical willow is the tall-growing *black willow* of



J. Horace McFarland

The Weeping Willow is often planted to add beauty and charm to parks. It is also a means of preventing soil erosion, and the soft wood is used to make wicker furniture.

eastern North America. It has very dark bark and the leaves are narrow and curved at the tips. The *white willow* is another tall species. It was brought to America from Europe. The underside of its leaves looks whitish. The original white willow was very hardy. A number of varieties have been developed and are now more numerous than the original, although not so hardy.

The *crack willow* was also brought to America from Europe. It is named "crack" because many of its brittle twigs break off during high winds. Another introduced species is the *weeping willow*, which has beautiful drooping branches. The shrublike *pussy willow* is covered with furry catkins in spring.

Few trees have more uses than the willow. It is used as a hedge and shade tree because of its rapid growth. Its roots absorb great amounts of water, and it is often planted to dry out damp soil, or to improve sanitation.

The heartwood of willows is brownish, soft, and light. It is used for cabinetwork, cricket bats, artificial limbs, and in the manufacture of paper pulp and a fine charcoal. The bark contains a large amount of tannin, and is also the source of the medicinal extract *salicin*. A perfume is distilled from the flowers of the Egyptian willow.

The most important industrial use of willow wood is in making wickerwork and baskets from the young shoots, or *osiers*. Certain sections in western and central New York, southeastern Michigan, and other localities

specialize in the growing of willows for this purpose. This work is called *osier culture*. This practice is important in England also, as well as in The Netherlands, Belgium, and France.

W.M.HAR.

See also CATKIN; OSIER; PUSSY WILLOW.

Classification. Willows belong to the family *Salicaceae*. The black willow is *Salix nigra*, the white willow is *S. alba*, the crack is *S. fragilis*, the pussy willow is *S. discolor*, and the weeping willow is *S. babylonica*.

WILLOW GOLDFINCH. See BIRD (State Bird).

WILLOW HERB. See FIREWEED.

WILLS (MOODY), HELEN NEWINGTON (1906-). See TENNIS (American Tennis Champions).

WILMINGTON, Del. (population 112,504). This industrial center is most famous as the home of E. I. du Pont de Nemours Company. In peacetime this giant corporation is one of the largest producers of chemicals, plastics, and synthetic cloth and dyes in the United States. During World Wars I and II, the Du Pont Company produced a large part of the explosives used by the Allied armed forces.

Location, Size, and Description. Wilmington lies on the Delaware River in the northern part of the state, at the point where the Delaware receives the waters of the Brandywine and Christiana rivers. Philadelphia, Pa., lies twenty-seven miles northeast of Wilmington, and Baltimore is sixty-nine miles southwest. The city is built on high land at the junction of these rivers, and extends about three to four miles back from the Delaware River. The Delaware has a thirty-five-foot channel to the Atlantic Ocean, and is nearly two miles wide at this point. A marine terminal for the city is located near the point where the Christiana River empties into the Delaware.

Cultural Life. Wilmington has excellent public school and library systems. Libraries are also maintained by the Wilmington Historical Society and the Wilmington Law Association. The Wilmington Art Institute has an outstanding collection of famous paintings. The most famous of several churches in the city is the Old Swedes Church, which was built in 1698. Its first bell was hung in a near-by tree. Wilmington parks cover about 700 acres, and there are a number of playgrounds.

Industry and Transportation. The leather industry is one of the most important activities in Wilmington. There are nine large factories engaged in the tanning of hides for leather. There are also fiber factories and plants

for the dyeing, bleaching, and finishing of cotton fabrics. There are large shipbuilding yards, foundries and machine shops, tobacco factories, and paper mills. In all, more than 260 industrial plants manufacture more than 120 different products.

The city is served by the trunk lines of three railroads and by interurban and motorbus lines. Steamers go from Wilmington harbor to ports on Delaware Bay and to Atlantic and Pacific coast ports.

History. The first settlement on the site of Wilmington was Christianaham. Swedish and Dutch colonists under Peter Minuit founded it in 1638 on the site of an Indian village called Minquas. In 1655 the name was changed to Fort Altena by the Dutch, who took possession of the place under Peter Stuyvesant. In 1664 the settlement was granted to the Duke of York by his brother Charles II of England. Its name was changed to Willington in 1731 to honor Thomas Willing, who laid out the plans for the town. Later the name was changed to Wilmington. The community was incorporated as a borough in 1739. In 1802 Éléuthère du Pont de Nemours built a powder mill on the outskirts. Wilmington was chartered as a city in 1832. During World War II, thousands of servicemen were stationed at Fort Du Pont, at Delaware City, ten miles south and west of Wilmington. The fort was the center of the army's Delaware Bay coastal defenses.

H.V.H.

See also DU PONT COMPANY.

WILMINGTON, N.C. (population 33,407), is a seaport about thirty miles from the mouth of the Cape Fear River in southeastern North Carolina. Until 1910 Wilmington was the largest city in the state. But it has since been outgrown by a number of other North Carolina cities, especially in the Piedmont Region. During World War II, Wilmington became a boom town because of its shipbuilding and other war industries. Wilmington was settled about 1728 as New Liverpool. When the town was incorporated in 1739, it was renamed in honor of the Earl of Wilmington.

The headquarters occupied during the Revolutionary War by the British general, Lord Cornwallis, may be seen here. Wilmington is the county seat of New Hanover County.

C.C.R.

WILMINGTON COLLEGE is a coeducational school at Wilmington, Ohio. It is controlled by the Society of Friends, or Quakers. The school has a college of liberal arts and a teachers' college. Wilmington College was founded in 1870, and has an average enrollment of about 300.

S.A.W.

WILMOT, DAVID (1814-1868), was an American politician who is chiefly noted as the author of the Wilmot Proviso. He was born in Bethany, Pa. As a young man he studied law and practiced in Towanda, Pa. In 1845 he entered politics, and served as Representative in Congress until 1851. Three years later he joined the Republican party and in 1861 was elected Senator. In 1863 he became judge of the Court of Claims.

W.B.H.

See also WILMOT PROVISIO.

WILMOT PROVISIO, *proh VI 20h*. On August 8, 1846, an important bill was offered for the approval of the United States House of Representatives. The bill provided an appropriation of \$2,000,000 for the negotiation of a peace with Mexico, which was then at war with



Ewing Galloway

The Du Pont Building in Wilmington, Del.

the United States. The money was to be used for the purchase from Mexico of new territory for the United States. David Wilmot, a Democratic Representative from Pennsylvania, offered an amendment to the bill. The amendment declared that slavery should be forbidden in any territory obtained by the United States with the \$2,000,000 appropriation. This amendment was known as the Wilmot Proviso.

The House of Representatives approved the amendment on February 15, 1847. But the Senate refused to pass the Proviso. For several years, the Wilmot Proviso was offered as an amendment to many bills, but it was never carried. Debates about the amendment raged throughout the country as well as in Congress. The question of slavery in the territories was finally settled by an act of 1862, which prohibited slavery in any of the territories of the United States. J.D.H.

See also WILMOT, DAVID.

WILNO, *VEEL* *noh*. See *VILNA*.

WILSON, N.C. (population 19,234), is the largest bright-leaf tobacco market in the world. The market ordinarily sells from 50,000,000 to 90,000,000 pounds of tobacco every year, for which from \$20,000,000 to \$40,000,000 is paid. Wilson lies in the upper coastal plain area of North Carolina, in the heart of the new bright-leaf tobacco belt. Tobacco auctions are held during the fall months. Wilson is the home of Atlantic Christian College. The town is the county seat of Wilson County. C.C.R.

WILSON, ALEXANDER (1766-1813), was a Scottish-American poet and ornithologist, or authority on bird life. His nine-volume work, *American Ornithology*, is considered a classic. Wilson was the first to describe more than forty new species of American birds, some of which were named after him. He was born in Paisley, Scotland, and spent his early life as a weaver and peddler. In 1792 he was put in prison for writing a poem, "Watty and Meg," which attacked the evils of the cotton mills. Two years later he was released and he came to the United States. For a time he taught school near Philadelphia, but he finally gave up teaching to devote all his time to the study of bird life of the eastern United States. B.J.

His *Works* include a volume of verse and *The Foresters*, a poetical account of a trip to Niagara Falls.

WILSON, ALLEN BENJAMIN (1824-1888). See CONNECTICUT; SEWING MACHINE.

WILSON, CHARLES THOMSON REES (1869-). See WILSON CLOUD CHAMBER.

WILSON, EDMUND (1895-), is an American writer. His works include poems, fiction, and plays, but he is best known as a literary and social critic. For a number of years he was sympathetic to communism, but he later became critical of the Soviet Union.

Wilson was born in Red Bank, N.J., and was graduated from Princeton University. After service in World War I, he worked on a number of magazines including *Vanity Fair*, *New Republic*, and *The New Yorker*. C.M.R.

His *Works* include *Axel's Castle*; *Travels in Two Democracies*; *To the Finland Station*; *Memoirs of Hecate County*; and *The Boys in the Back Room*.

WILSON, ERNEST HENRY (1876-1930), was a British-American plant explorer and horticulturist. He was born

in Gloucestershire and was educated at the Birmingham Technical School and the Royal College of Science. In 1899 and 1903 he explored western China for a nursery company, and brought back about 2,000 lots of seeds and many young plants. In 1906 he joined the Arnold Arboretum of Harvard University. He became assistant director in 1919 and keeper in 1927. He made three trips to China for the Arboretum, as well as three through the Japanese Empire and one to Australasia, India, and Africa.

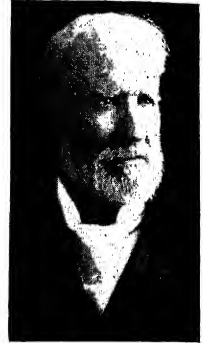
Wilson introduced about 1,500 kinds of flowers, shrubs, and trees into England and the United States. Many of these now are sold by seed houses and nurseries. His popular writings on horticulture include *A Naturalist in West China*, *Aristocrats of the Garden* and *China, Mother of Gardens*. C.L.F.

See also ARBORETUM.

WILSON, HENRY (1812-1875), was Vice-President of the United States under President Ulysses S. Grant from

1873 until his death. He was born at Farmington, N.H. His name was originally Jeremiah Colbath, but he changed it as a youth. Wilson first became known as a Free-Soil orator, but later he was one of the founders of the Republican party.

WILSON, JAMES (1835-1920), was an American farmer and politician. He served as Secretary of Agriculture from 1897 to 1913. Wilson was born in Ayrshire, Scotland, but came to the United States when he was sixteen. He attended Iowa College, and became a farmer in Tama County, Iowa. Wilson served several years in the Iowa State Legislature, and later served three terms in Congress. E.E.Ro.

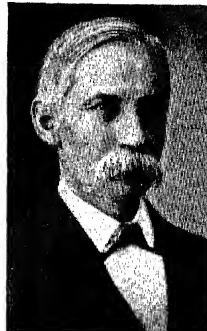


Brown Bros.
James Wilson, Iowa statesman and farm expert

WILSON, JOHN. See NORTH, CHRISTOPHER.

WILSON, WILLIAM LYNE (1843-1900), was an American lawmaker and educator. He was a representative in

Congress from West Virginia from 1883 to 1895, and in 1894 secured the passage in the House of the Wilson Tariff Bill. Wilson was born in Jefferson County, Virginia. He studied at Columbian College (now George Washington University) and the University of Virginia. Later he taught and practiced law. In 1882 he became president of the University of West Virginia. He also served as Postmaster General from 1895 to 1897 and as president of Washington and Lee University at Lexington, Va., from 1897 until his death. E.E.Ro.



Brown Bros.
William L. Wilson, American legislator

28th President of the United States, 1913-1921

WILSON, (THOMAS) WOODROW (1856-1924), was in many ways one of the most remarkable men in United States politics. Wilson was a scholar. He was more at home in the scholar's world of books and ideas than in the practical politician's world of men and issues. Yet he became the greatest leader the American people had known since Abraham Lincoln. Wilson was deeply devoted to world peace, but he was forced to lead the United States in the most terrible war the world had known. He seemed unfitted for the hurly-burly of political action. But few American statesmen have shown a deeper understanding of the game of politics.

Most persons formed a very definite opinion about Wilson. Few men have been so loved or hated as he was. At the end of the war, millions of persons in Europe and the Americas almost worshiped him. But he had also made many bitter enemies. Many men who sounded reasonable and sensible on other subjects almost sputtered with hatred when they spoke of Wilson.

Historians and biographers have found it easy to point out faults in Woodrow Wilson's personality. He could be stubborn and headstrong. He never seemed to doubt the complete rightness of his own opinions. He was cold and unforgiving toward those who clashed with him or tried to keep him from having his own way.

Wilson's virtues were only a little more pleasing than his faults. He was completely outspoken and truthful in telling other persons their weaknesses. He had the advantage of an excellent education, and had little patience with persons who were not so well educated as he. He could turn warm friends and admirers into bitter enemies almost overnight by this lack of patience, and his habit of telling others of their faults.

But none of Wilson's enemies ever called him weak or stupid. No one suggested that he was dishonest, or that he would turn aside from what he thought right even in order to favor his best friend. And today many persons agree that on the great questions of his time Wilson was as completely right as he thought he was.



U&L

Probably no man of Wilson's time could equal his understanding of the world's problems, or of what could be done about them. He brought high idealism, bold imagination, and steadfast courage to the tasks of war, and of reform within the country.

Early Years

Thomas Woodrow Wilson was born at Staunton, Va., on December 28, 1856. His father was Joseph Ruggles Wilson and his mother was Janet Woodrow Wilson.

Family influence did much to shape the future President's character. Joseph Wilson was a Southern Presbyterian minister, scholar, and teacher. He was the son of James Wilson, a Scotch-Irish immigrant who became a well-known Ohio newspaperman and legislator.

Janet Woodrow also came from a family which was famous for its education and accomplishments. Her father, Thomas Woodrow, was a Scottish Presbyterian minister who had been a missionary to China. One of her brothers, James Woodrow, a scientist and student of religion, led the fight for freedom to teach about evolution in the South.

Young Thomas (in later life he dropped his name and chose to be called Woodrow) was surrounded from the time he was born by people who believed in Presbyterian doctrines, who were deeply religious, and who had a great respect for education. The influence of his early training stayed with Wilson as long as he lived.

Education. Young Thomas Wilson did not start to school until the end of the War between the States, when he was nine years old. He learned slowly, and could not read easily until he was eleven. But in spite of this late start, he was ready for college before he was seventeen. In 1873 he entered Davidson College, in the western part of North Carolina.

Davidson was the best Presbyterian school in the region, but like all Southern colleges it had been hard hit by the war. The students had to do much of the

work of keeping the school in operation. Young Wilson was not strong. Life at Davidson was too hard for him, and his health began to fail. He had been forced to wear glasses from childhood, and his weak eyes now gave out under the strain of hard study. Wilson had to leave college before he had finished his freshman year.

By the fall of 1875 Wilson had recovered his health, and entered Princeton College. He was not well prepared and in his first year made a poor record. But his work improved steadily, and he found time for many college activities outside of his studies. In his senior year, he was secretary of the football association and one of its directors. He was also managing editor of the college paper, the *Princetonian*, and contributed to the *Nassau Literary Magazine*. He published an essay called "Cabinet Government in the United States" in the *International Review*. In 1879 he was graduated thirty-eighth in a class of 106.

Wilson next entered the law school of the University of Virginia. Here he had good training in the study of law, and made lasting friendships. He took an active part in the debating societies, and became recognized as the best public speaker in the University.

In 1882 Wilson hopefully opened a law office in the growing city of Atlanta, Ga. He had few clients, so he gave much of his time to the study of jurisprudence, or the science of law, and to an analysis of congressional government in the United States. During this year he fell in love with Ellen Axson, the daughter of a Presbyterian minister.

By the end of his first year in Atlanta, Wilson had discovered that he was not a success as a lawyer. So he decided to become a college professor. He closed his law office and took up graduate study in history and politics at the new Johns Hopkins University in Baltimore.

Educator and Man of Letters. At the university, Wilson came into contact with minds as brilliant and deep-thinking as his own. He met young men who later made important contributions to scholarship. These included the historians F. J. Turner and J. F. Jameson, the economists Richard Ely and Davis R. Dewey, and Albert Shaw, who later became editor of the *Review of Reviews*. Wilson and young Ely worked together on a study of American economists, which was never published.

In 1885 Wilson published the book *Congressional Government, A Study in American Politics*. Educators, law-makers, and students praised his book. Offers of jobs began to come in. The future looked secure, and Ellen Axson and Woodrow Wilson were married. Wilson took a position as associate professor of history and political science at Bryn Mawr College, which had opened in 1880 at Bryn Mawr, Pa. In 1886 Wilson was granted his Doctor

of Philosophy degree from Johns Hopkins University.

Wilson was successful at Bryn Mawr, but he did not like teaching in a girls' school. In 1888 he moved to Wesleyan University at Middletown, Conn. A year later he published his most important scholarly work, *The State*. By this time he had gained a national reputation for his work as a teacher and writer. In 1890 he was invited to become professor of jurisprudence at Princeton. His fame as a scholar and teacher grew steadily during the next ten years. Several colleges offered him positions as college president. But he refused all such

offers until 1902, when he was elected the president of Princeton University. This position had never before been filled by anyone but a clergyman.

Wilson's duties as president of Princeton cut short his career as a writer and scholar. He could no longer find time to turn out articles on history and criticism for magazines, or to publish an occasional book. His only scholarly work after taking the presidency was called the *Constitutional Government in the United States* (1908). It was the printed version of a series

of lectures delivered at Columbia University.

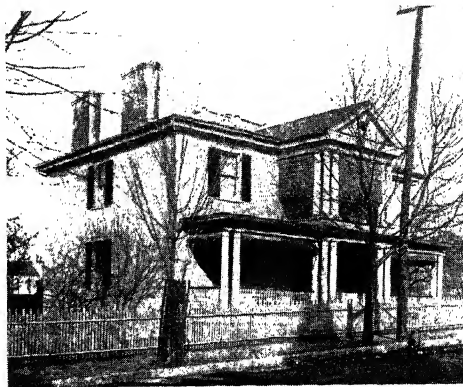
University President. As soon as Wilson took office, he announced that he intended to change the University from "a place where there are youngsters doing tasks to a place where there are men thinking."

Wilson's educational reforms won high praise from the few who understood such matters. But what brought the new president of Princeton to public attention was his fight to reform the eating-clubs, which were somewhat like the fraternities in many other schools. Some of these clubs had restricted their memberships and become very exclusive. Wilson thought they were undemocratic. At first many of the students, including members of the clubs, thought Wilson's idea was a sound one. But the alumni were furious because they enjoyed coming back to their clubs at reunions or football games.

Many persons who read the newspaper accounts of this fight did not clearly understand the question, but they felt that Wilson was fighting for democracy and against snobbery. Wilson was pictured as one who favored people of average means, power, and ability rather than rich and powerful people. Such a picture won popular approval.

Public and Political Career

Candidate for Governor. James Smith, the Democratic party boss in the Republican state of New Jersey, began to think that Wilson might make a good candidate for governor. The party's record was so bad that it needed a candidate whose honesty was above question. At the same time, Col. George Harvey, the editor of



Woodrow Wilson's Birthplace in Staunton, Va.

WHILE WOODROW WILSON WAS PRESIDENT



Virgin Islands Purchased from Denmark, 1917

Three Amendments to the Constitution Adopted

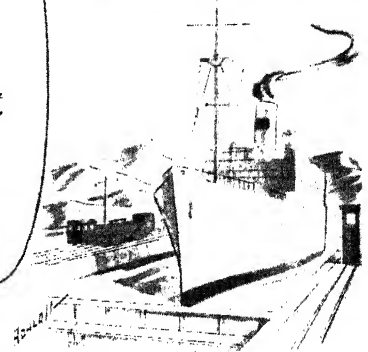
17th Amendment, 1913

18th Amendment, 1919

19th Amendment, 1920



President Revives Custom of Addressing Congress, 1913



Panama Canal Opened, 1914



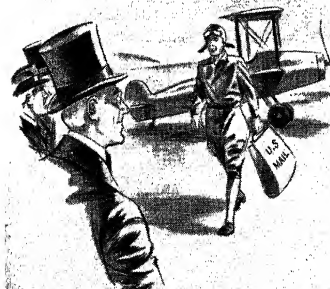
Federal Reserve System Established, 1913



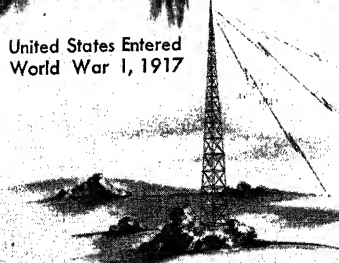
United States Entered World War I, 1917



League of Nations Established, 1920



First Air Mail Route Established between New York and Washington, 1918



Harper's Weekly, decided that such a man as Wilson might be able to check the influence of the "radical" followers of William Jennings Bryan in the Democratic party. Smith and Harvey together could almost control the nomination, and they offered it to Wilson.

They could not have timed the offer better. Wilson had just lost a bitter fight with Andrew West, the Dean of the Graduate School at Princeton. On the surface their quarrel was about the location of the new Graduate School Building. But actually the dispute went much deeper. It was really a question of which man would control the whole program of graduate studies. The fight ended when a wealthy graduate of Princeton died and left several million dollars to the Graduate School on the condition that Dean West should be in charge. Wilson had to yield, but he was unhappy and ready to change jobs.

Wilson knew the facts of machine politics because he had studied the subject of government and governmental policies very closely. He suspected at once that Smith was planning to use him for some hidden purpose. Smith had once been in the Senate, and Wilson thought he might be planning to seek election to the Senate again. Smith promised that he would not be a candidate, and would not try to control Wilson. Wilson said he would run with that understanding.

Governor of New Jersey. Wilson made a good campaign. He was elected by the largest majority any Democrat had ever had in New Jersey. At once he made it clear that he wanted nothing to do with the dishonest practices of the Democratic machine.

In those days, Senators were elected by the state legislatures. To everyone's surprise, Wilson's smashing victory had carried a Democratic legislature into office. Smith began to regret his promise not to run for the Senate, which he had made when he saw no hope of getting the job. Finally he decided to forget his promise, and tried to force his election through the legislature. Wilson advised him to withdraw. When Smith refused, Wilson openly opposed and defeated him.

In the meantime, Wilson was pushing through the state legislature a series of reforms which changed New Jersey from one of the most conservative to one of the most progressive states of the Union. In rapid succession came a primary election law, a corrupt practices act, a public utilities act, an employers' liability law, an act permitting cities to adopt the commission form of government, and various school reform laws. Wilson did not hesitate to break long-established customs in his political fights. He went outside the state for his superintendent of schools. He frequently asked the advice of members of the legislature, and sometimes turned up unexpectedly at their private meetings. He did not hesitate to appeal directly to the people, over the heads of legislators and officials. He had already used this method as president of Princeton, and he was to use it again when he became President of the United States.

Wilson could not fail to get national attention. The progressive wing of the Democratic party was looking for a candidate to take Bryan's place. Progressive Democrats turned more and more to Wilson. By 1911 he was clearly a candidate for the presidential nomination, and he made it his business to speak widely on national is-

suess throughout the country. Most important, he won the confidence of the official leader of the party, William Jennings Bryan.

When the Democratic convention met in Baltimore in June, 1912, Wilson was the candidate of the progressives. He faced strong opposition. "Champ" (James Beauchamp) Clark of Missouri was the leading candidate. Oscar Wilder Underwood of Alabama and Judson Harmon of Ohio were both strong rivals. On the tenth ballot, Clark got a majority of the vote, and it seemed certain that he would win. Not since 1844 had a candidate who held a majority failed to get the necessary two thirds. But Wilson's followers stayed with him. On the thirteenth ballot William Jennings Bryan swung over to Wilson. The old progressive arose to explain his vote. He pointed out that "Boss" Murphy (Charles Francis Murphy) of Tammany Hall had thrown his support to Clark, and that it was therefore clear that Clark had made a deal with Tammany. Bryan said that the Nebraska delegation, which he headed, would switch its support from Clark to Wilson.

Bryan's support was the beginning of a swing toward Wilson. Every ballot brought a few more votes in favor of Wilson. On the forty-sixth ballot, Woodrow Wilson became the Democratic candidate for President of the United States.

The Democratic nomination in 1912 meant almost sure election. The Republican party was badly split. The Old Guard, or conservative Republicans, had renominated President William Howard Taft. The Republican progressives had withdrawn their support from the party's candidate and put up their beloved leader, Theodore Roosevelt. The real campaign was actually between the two progressives, Wilson and Roosevelt. In a series of campaign speeches later published under the title *The New Freedom*, Wilson stirred the country with his eloquence, his vision, and his grasp of national problems. Wilson got 435 electoral votes to 88 for Roosevelt and only 8 for Taft. The popular votes were a clear endorsement of a liberal reform program: 6,286,214 for Wilson, 4,216,020 for Roosevelt, and only 3,483,922 for the conservative Taft. Thomas R. Marshall, who had served as Governor of Indiana, was elected as Vice-President.

Administrations as President (1913-1921)

Inaugural Address. The election gave the Democrats a majority in both houses of Congress, as well as the Presidency. This Democratic majority throughout the country made it clear that the new President would have a chance to show what he could do. He would not be opposed by a Congress in which most of the members were of the rival political party. Wilson accepted the challenge in his inaugural address. "No one can mistake," he said, "the purpose for which the Nation now seeks to use the Democratic party. It seeks to use it to interpret a change in its plans and point of view." Among other things that needed changing, Wilson named the tariff, the banking system, industry, and agriculture. He promised to put the nation "at the service of humanity," and called upon "all patriotic, all forward-looking men" to help him.

Cabinet. The Democrats had been out of power so

WILSON, WOODROW

long that nearly all their well-known leaders were in Congress. When Wilson chose his Cabinet, he did not want to draw these famous Democratic leaders out of Congress, where his program needed their help. Bryan, the grand old man of the Democratic party, was named Secretary of State. But most people had never heard of the rest of Wilson's Cabinet. It was a capable group. Many of its members, such as William Gibbs McAdoo, Franklin K. Lane, and Josephus Daniels, soon won wide and favorable attention. But people were puzzled at first, for they had expected to see well-known Democrats appointed.

Legislative Program. Wilson called Congress into special session on April 7 to pass a new tariff bill. For the first time since the days of Thomas Jefferson, the President delivered his message to Congress in person. The Underwood Tariff was the first of a long list of reform measures. It lowered rates on goods shipped into the country, and took all duties off wool, sugar, iron ore, steel rails, and several other items. A graduated income tax was placed on incomes over \$3,000 to make up for the loss of revenue which resulted from the lowered tariff rates. See **INCOME TAX**.

On June 23, while the tariff was still being debated in Congress, Wilson presented his program for reform of the banking and currency laws. Representative Carter Glass of Virginia was ready with a bill which was hotly debated for six months. This bill—the famous Federal Reserve Act—was finally passed about as the President wanted it. Today the act is still in force, and is recognized as the most statesmanlike and effective banking and currency measure in the nation's history. See **FEDERAL RESERVE SYSTEM**.

A series of laws helped the railroads straighten out their tangled finances, and established an eight-hour working day for railroad employees. The Federal Trade Commission was set up to investigate and stop unfair trade practices. (See **FEDERAL TRADE COMMISSION**.) The Clayton Anti-Trust Act increased the power of the Federal Government to protect the public from big business. Several bills were passed to help agriculture. These included measures which made it easier for farmers to borrow government funds, which provided for the improvement of rural education and a program of road building, and which increased the services of the Department of Agriculture. A new Pure Food Law was passed to protect consumers. No administration in history had seen the passage of so many great reform laws. Most of them, with some changes, remain in force today.

One reform the administration could not bring about was the ending of child labor. Two laws were passed for this purpose, but the Supreme Court declared them unconstitutional. Wilson was able to take one step toward making the Supreme Court more liberal when he appointed the great Louis D. Brandeis as a justice.

Wilson's program kept Congress in session longer than ever before in the nation's history. Congress passed the laws the President asked for, and they went to the root of the economic problems of the time. Wilson had proved himself a great peacetime statesman. His first term has been called "the most constructive since that of George Washington."

Foreign Affairs. Wilson had said nothing about



Woodrow Wilson and Raymond Poincaré, President of France, riding through Paris. Wilson came to France to attend the World War I Peace Conference. His historic Fourteen Points were argued, but generally agreed upon at the meeting.

foreign affairs in his inaugural address. But foreign affairs demanded much of his attention. He persuaded Congress to repeal the law which let United States ships use the Panama Canal without paying tolls, because he thought this law violated a treaty with Great Britain. He refused to approve a bankers' loan to China, and put himself on record against "dollar diplomacy." Wilson insisted that his party live up to its promise of independence for the Philippines. He had the satisfaction of signing the Jones Bill, which set a date for Philippine independence and made many reforms in the administration of the islands.

Mexican Problem. In 1911 the dictator of Mexico was forced to resign. A liberal reformer, Francisco Madero, became president. The great Mexican landowners and many foreign investors organized a revolution. Madero was shot, and Victoriano Huerta was put in as president. This meant that rich Mexicans and foreign businessmen could go on making money at the expense of the Mexican people. Most of the great powers recognized Huerta's government at once. But Wilson refused to do so. He spoke out clearly against "government by assassination," saying "We hold that just government rests always on consent of the governed."

In 1913 Wilson told Congress there could be no peace in Mexico while Huerta was president. Wilson's attitude encouraged a Mexican revolution against Huerta. The Mexican president arrested several United States sailors and refused to make any apology. American forces then occupied the Mexican port of Veracruz. Eighteen American lives were lost in this action. Open war between the United States and Mexico seemed certain to break out.

At this point, Wilson accepted an offer of the ABC powers (Argentina, Brazil, and Chile) to arbitrate the dispute. For the first time in the history of the Americas, an international conference took over a dispute between two countries and worked out a peaceful settlement. Huerta fled and Venustiano Carranza became presi-

dent. Wilson's policy of peace showed itself justified by the results of his efforts.

But his Mexican troubles were not over. Francisco Villa, Carranza's chief of staff, quarreled with his leader and led a new revolution. Government forces drove Villa into northern Mexico, where he began making raids on American settlements across the Rio Grande. Many Americans called loudly for war, but Wilson would not yield. "Watchful waiting" was still his policy. He sent troops under General John Pershing to patrol the border, and later ordered Pershing to pursue Carranza, and relations between Mexico and the United States steadily improved.

Caribbean Affairs. Both Wilson and Bryan, his Secretary of State, were peaceful men who hated imperialism, or territorial extension through conquest. But their policy toward the countries and islands in the Caribbean area was not much different from that which Theodore Roosevelt and William Howard

they sent troops to rly Nicaragua. In 19
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World War I

Beginning of the War. In

Americans were stunned by the news that Germany had invaded France, and that Russia had invaded Germany. World War I had begun. After the first moments of shock and unbelief, most Americans joined in a single cry, "Let's stay out of it." Wilson proclaimed that the United States was neutral, and asked the American people to be neutral even in thought. But this was easier to say than to do.

A torpedo from a German submarine sank the passenger liner *Lusitania*. There were 128 American lives lost when the ship went down. (See WORLD WAR I [America Enters the War]). Americans were enraged, but Wilson remained cool, and started negotiations with Germany which he hoped would end the illegal use of the submarine as an offensive weapon. Angry men called him a "human icicle." Theodore Roosevelt called him a "Byzantine logothete," and people got out their dictionaries and history books to learn that this term means, freely, an official who talks a lot but does nothing.

At the same time, other people were saying that Wilson was "dragging the country into war." Women in mourning gathered at the White House to sing "I Didn't Raise My Boy to Be a Soldier." Pacifists who hated all wars, persons who favored Germany, and persons who hated Great Britain joined forces to attack Wilson.

Probably most Americans approved Wilson's efforts to maintain "peace with honor." But these people kept quiet, while extremists made a great noise.

Election of 1916. Wilson was nominated for the Presidency without opposition. The Republicans chose Supreme Court Justice Charles Evans Hughes, whose

clean record and unswerving honesty were known throughout the country.

Wilson's record of achievements would have won him easy re-election in normal times. But the war overshadowed all other questions. Democratic orators effectively used the slogan "He kept us out of war." Wilson refused to use this argument, for he knew that at any time Germany might go back to the policy of unrestricted submarine warfare, and that this would force the United States to fight. His own position was clearly set forth in a speech he made in 1916. Wilson said, in part,

I know that you are depending upon me to keep this Nation out of the war. So far I have done so and I pledge you my word that, God helping me, I will — if it is possible. But you have laid another duty upon me. You have bidden me to see to it that nothing stains or impairs the honor of the United States, and that is a matter not within my control; that depends upon what others do, not upon what the Government of the United States does. Therefore, there may at any moment come a time when I cannot preserve both the honor and the peace of the United States. Do not exact of me an impossible and contradictory thing.

The contest for the election was close, and delays in receiving returns made the outcome doubtful for several days. In the end Wilson won by an electoral vote of 277 to 254 for Hughes. Marshall was re-elected as Vice-President.

Declaration of War. In February, 1917, Germany again began unrestricted submarine warfare. Wilson at once broke off diplomatic relations between the United States and Germany. Later in the month, the British secret service uncovered a German plot to involve Mexico in war with the United States. In March, submarines sank five American merchant ships. Wilson's patience was at an end. On April 2, he asked Congress for a declaration of war, saying:

It is a fearful thing to lead this great peaceful people into war, into the most terrible and disastrous of all wars, civilization itself seeming to be in the balance. But the right is more precious than peace, and we shall fight for the things which we have always carried nearest our hearts, — for democracy, for the right of those who submit to authority to have a voice in their own Government, for the rights and liberties of small nations, for a universal dominion of right by such a concert of free people as shall bring peace and safety to all nations and make the world itself at last free. To such a task we can dedicate our lives and our fortunes, everything that we are and everything that we have, with the pride of those who know that the day has come when America is privileged to spend her blood and her might for the principles that gave her birth and happiness and the peace which she has treasured. God helping her, she can do no other.

On Good Friday, April 6, 1917, Congress passed a joint resolution declaring war on Germany.

America at War. The American people met the emergency with an outpouring of loyalty and patriotism unequalled in their past history. Economic and social changes were accepted with patience and good humor. A general draft law was quickly passed. Almost 25,000,000 American men between the ages of 18 and 45 were registered in the course of the war, and over two million were drafted. The regular army, the navy, and the marine corps continued to be recruited by voluntary



International News

President Woodrow Wilson's Tragic Last Tour, which ended with his collapse. The President is shown in Columbus,

Ohio, one of the stops in his campaign to gain public support for United States entry into the League of Nations.

enlistment. Before the end of the war, about four million men were in uniform.

Industrial mobilization was no less important than military mobilization. The government took over much of the control of industry, labor, and agriculture. It took over the railroads and the telegraph lines. It began to limit the consumption of certain foods. It set up a fuel administration which increased coal production and cut down consumption. It undertook an ambitious ship-building program and greatly enlarged the merchant marine. Even public opinion was organized through the Committee on Public Information. For a discussion of military and naval operations, see **WORLD WAR I**.

Wilson's Moral Leadership. The President's leadership was a vital factor in the entire war effort. Wilson proved himself one of the greatest and most successful war Presidents. Even more important was the moral leadership which he gave to the American and the Allied cause. His war speeches were delivered in language of splendid eloquence. They stirred the hearts and fired the imaginations of men everywhere. They made clear the great issues of the war, defined the aims for which the democracies fought, and pointed the way to a better world order. Probably the most important of all Wilson's speeches was the one he delivered on January 8, 1918. This speech set forth the Fourteen Points for the peace settlement.

The Fourteen Points. Wilson's fourteen points stated

the general purpose of the Allies. His speech also did much to undermine German morale and bring the Germans to an appeal for peace on the basis of the program proposed. A summary of the fourteen points is given below:

Open peace covenants, or agreements; no private international diplomacy.

Absolute freedom of navigation outside territorial waters in peace and in war, except in case of international action to enforce covenants.

Removal of all possible economic barriers and establishment of equality of trade conditions.

Guarantees that national armaments would be reduced to the lowest point consistent with safety.

Free, open-minded, and impartial adjustment of all colonial claims.

Evacuation of all Russian territory; settlement of Russian questions to obtain opportunity for independent national policy; a welcome for Russia into the society of free nations.

Evacuation and restoration of Belgium.

French territory freed, invaded portions of France restored, Alsace-Lorraine wrong righted.

Readjustment of Italian frontiers along lines of nationality.

Opportunity for autonomous development for the peoples of Austria-Hungary.

Rumania, Serbia, Montenegro evacuated; occupied territories restored; Serbia given free access to the sea; independence and integrity of the several Balkan states guaranteed.

Sovereignty for the Turkish parts of the Ottoman Empire; autonomous development for the other nation-

alities under Turkish rule; the Dardanelles demilitarized. An independent Polish state created and guaranteed integrity.

A general association of nations formed under specific covenants to guarantee political independence and territorial integrity to all countries.

On November 9, 1918, less than a year after Wilson had stated his Fourteen Points, the German Kaiser gave up the control of the German government and fled to The Netherlands. Two days later an armistice was officially proclaimed, and the war was at an end.

Postwar Period

The Peace Settlement.

Wilson had laid down the general principles of the peace settlement with the statement of his Fourteen Points. After the Armistice had been signed, he decided to go with the United States delegation to the peace conference at Paris. He wanted to make sure that his general principles, such as "the self-determination of peoples" and "open covenants openly arrived at," were translated into definite peace terms. That decision may have been unwise. Many people criticized him for picking a peace delegation that had not a single strong Republican member. But many others praised Wilson for his decision to attend and control the peace conference.

Most persons now believe that Wilson knew he was, at the moment, the most powerful man in the world, and proposed to use his position for the benefit of mankind. He knew that the United States would be the only power at the peace table which wanted nothing for itself. He thought it necessary that the United States should be represented by its real political head, as were Great Britain, France, and the other powers. He realized, too, that he alone of the representatives of the great powers was really interested in a league to preserve peace. He was determined to see to it that a plan for a league of nations banded together to preserve peace was written into the final settlement.

At the Paris Conference Wilson succeeded in getting very nearly the kind of treaty he wanted. His chief interest was in a League of Nations, and his big fight was to get provisions for the League included in the terms of the peace treaty. For a time various other delegates opposed Wilson strongly on the subject of the League of Nations. But in the end Wilson persuaded them that

his way was right and best. See LEAGUE OF NATIONS.

The general principles of the Fourteen Points were accepted and applied in making the treaty. But in order to get what he thought right, Wilson had to give in on many minor points. These included, giving in to Italy on the Fiume cession, to Japan on the Shantung issue, and to the French and British on the question of reparations. Wilson's concessions weakened his moral position. Perhaps the biggest failure of the Conference was one which was little recognized at the time, and which Wilson did not see at all. That was the failure to have Russia represented in the general settlement.

See VERSAILLES, TREATY OF.

Opposition to the

League. In February, 1919, Wilson hurried home to discuss the League and the peace treaty with the Senate, and to quiet the rising tide of criticism in the country. His position was not strong, and he did little to strengthen it. The Congressional elections of 1918 had gone Republican, and it seemed that the country had already turned against Wilson's leadership. The Senate was in an ugly mood, partly because it had not been consulted on the peace terms, and partly because of political bitterness. Wilson soon found that he could not get the League accepted at home without some amendments protecting United States interests. Some of these were accepted by other delegates at the Peace Conference, after Wilson's return to Paris in March. But in the United States the Senate isolationists were still critical and opposed to the League, and inclined to find fault with Wilson for his stand.

Wilson returned to the United States early in July, 1919, with the full text of the treaty and the League. He found that public debate on the peace terms was already in full swing, and Congressional opposition was growing. Opinion on the question of ratification of the treaty divided, broadly, in three ways. Isolationists, led by Senators Henry Cabot Lodge, William Borah, Hiram Johnson, and Robert M. LaFollette, were against any League. Wilson and his loyal followers insisted that the treaty be ratified just as it stood. The largest group in Congress stood on a middle ground between Wilson and the isolationists. This group was ready to ratify the treaty with some changes. But nothing could win over the isolationists. Unfortunately for the future of the nation and the world, Wilson was



Mistress of the White House, Ellen Axson Wilson, died in August, 1914, 17 months after her husband became President.

almost as stubborn. At all times there was a clear majority in favor of the League; but it was impossible to get the two-thirds majority needed for ratification.

Wilson's Collapse. Wilson decided to take his case to the people — the method which had worked for him time and again in the past. On September 4, against the advice of his doctors, he set out on a speaking tour which carried him through the Middle West and Far West. On September 25, he spoke at Pueblo, Colo. That night, as his train sped eastward toward Wichita, Kan., Wilson collapsed, and the last hope of ratification was lost.

For the rest of his life Wilson was an invalid. But he was not willing to give up the Presidency. From his sickbed he watched with dismay the hopeless fight for his treaty. In November, 1919, the treaty was defeated in the Senate. It was brought up again in the following March. But once more it failed to get a two-thirds majority.

Wilson insisted that the treaty and the League should be the chief issue of the 1920 campaign. The Democratic campaign platform endorsed the League of Nations, and the Republican platform opposed it. In the elections that November, the Democratic candidate, James M. Cox of Ohio, was overwhelmingly defeated by the Republican candidate, Warren G. Harding. So far as the United States was concerned, the League was dead.

Retirement and Death.

The President was confident that the future would prove him right, and he bore the crushing blows of defeat with dignity and calm. He bought a home in Washington, and lived there until his death on February 3, 1924. He was buried in the National Cathedral in Washington. H.S.C.

Ellen Axson Wilson (1860-1914), the first wife of President Wilson, was the daughter of the Reverend S. E. Axson, the minister of the Presbyterian Church at Rome, Ga. She was an earnest, serious-minded, good-tempered woman, deeply devoted to her husband. Ellen Axson married Woodrow Wilson in 1885, and went with him to his first teaching job at Bryn Mawr College.

From the first, Ellen Wilson was sure that her husband would be a great man. But she had no wish to share his greatness. She hated even the publicity that came to her as wife of the president of Princeton.

When Wilson became Governor of New Jersey, his wife continued to avoid publicity. Her task, as she saw it, was to make a home where her husband could find calm

security and lay aside the cares of his heavy responsibilities. She fully accomplished this task.

In the White House, Mrs. Wilson was forced to change her way of life, but she did not change her ideas. With the help of her three daughters, she attended carefully to her official duties, but her greatest efforts went into making the White House as much like a private home as possible.

Mrs. Wilson died in August, 1914, seventeen months after she became mistress of the White House.

Edith Galt Wilson (1872-), Woodrow Wilson's second wife, was the widow of Norman Galt, a Washington jeweler. She was descended from an old Virginia family. Wilson met her about six months after the death of his first wife, and soon fell in love with her. The President's courtship made Mrs. Galt a target for gossips, not only in Washington, but all over the country.

The President and Mrs. Galt were married in December, 1915, at her home in Virginia. The second Mrs. Wilson was a gracious hostess and her husband's constant companion. She went with him to Europe during the Peace Conference. Her book, *My Memoirs*, was published in 1939.

An *Outline* suitable for the life of Woodrow Wilson will be found with the article "President of the United States."

See also LEAGUE OF NATIONS; NOBEL PRIZES; VERSAILLES, TREATY OF; WORLD WAR I.

Questions

How did Wilson's parentage and early life prepare him for leadership?

How was Wilson's school life as a boy unusual?

How did Wilson win the presidential nomination of the Democratic party in 1912? Why did this nomination mean almost sure election?

What was the slogan of the Democrats in 1916? Did Wilson himself agree with the idea of the slogan? Explain.

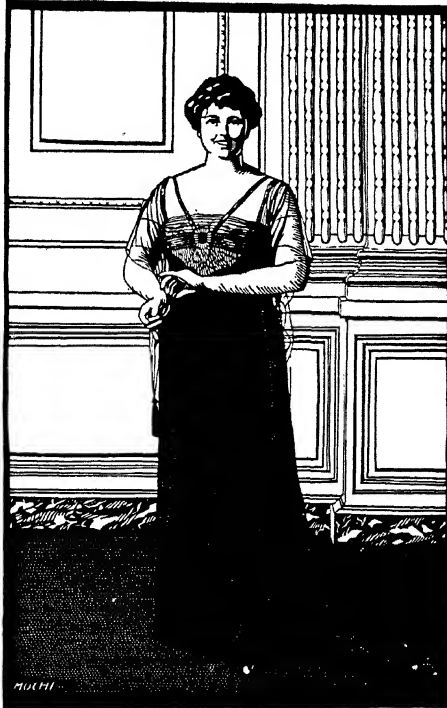
When and why did Wilson ask Congress for a declaration of war against Germany?

Why did Wilson go to the peace conference himself instead of sending delegates?

How was Wilson's plan for a League of Nations received in the United States? Why?

WILSON BILL, also known as the WILSON-GORMAN TARIFF ACT. See CLEVELAND, GROVER (Administrations as President [Second Administration]).

WILSON CLOUD CHAMBER is a device which enables scientists to see the tracks left by sub-atomic particles. It was invented by C. T. R. Wilson of Cambridge University in England. Wilson noted that vapor condenses on tiny bits of dust to form raindrops. He wondered if



Mistress of the White House, Edith Galt Wilson, was married to the President in 1915, while he was serving his first term.

it would condense on anything so small as a subatomic particle. After many experiments, he perfected the cloud chamber about 1912.

A typical cloud chamber consists of a glass flask with a rubber bulb at the bottom end, and water in the bulb and in about two thirds of the flask. A tiny bit of radium or polonium or other source of subatomic particles (due to its radioactivity) is placed at one side of the portion of the flask in which air is trapped above the water. When the bulb is compressed and suddenly released the air is suddenly expanded, and fog drops form on the ions which are created by the passage of the alpha particles from the radioactive material through the air. Alpha particles are helium nuclei, and are one type of emanation from the radioactive substance. These bombard the atoms of air and split them up into subatomic particles, one type of which are the ions. When the water vapor condenses on these ions they become visible and can be seen, or, if suitable photographic arrangements are made, they can be photographed. Another particle given off by the radioactive material is the beta particle or electron. Because alpha particles are much heavier than beta particles, the tracks created by them are straight and dense, while the tracks from beta rays are crooked and not so well defined, because beta rays, being very light, are deflected by many collisions, but the heavier alpha particles go along practically straight.

The photographs taken in cloud-chamber studies show clearly how various atoms break up, how fast their particles lose energy, and the combinations that take place when particles collide.

P.H.G.

WILSON COLLEGE is a privately controlled liberal arts school for women at Chambersburg, Pa. It is connected with the Presbyterian Church. The college was founded in 1870. Enrollment is limited to about 400 students.

P.S.H.

WILSON DAM. See TENNESSEE VALLEY AUTHORITY (The Dams).

WILSON TEACHERS COLLEGE is a coeducational school for the training of teachers at Washington, D.C. It is part of the public school system of the District of Columbia and is supported by appropriations from Congress. The B.S. degree is granted. Students who live in the District of Columbia pay no tuition. All students live at home or in approved rooming houses. Wilson College was founded in 1873 and has an average enrollment of about 500.

C.M.Hv.

WILT, in plants, is a condition in which the leaves and stems droop and die. It is usually a symptom of plant diseases which cause the cells to collapse. A plant wilts if it needs water. Disease bacteria that cause wilting stop up the channels that carry water in the plant. Many fungi that attack plants may cause wilting, sometimes by secreting poisons into the plant tissues.

Many root diseases bring about wilting. *Fusarium* is a fungus that wilts asters, potatoes, tomatoes, cotton, flax, and other plants. *Sclerotinia*, another fungus, wilts many ornamentals and garden vegetables. Dutch elm disease, or Graphium wilt, is an important disease of elms. The fungus that causes this disease was brought to America from Europe.

Control of wilt depends on the disease that causes it. Generally, diseased plants should be removed and de-

stroyed, and the soil disinfected. Some of the newer varieties of plants produced by scientists are resistant to wilt.

W.F.H.

WILTON. See RUGS AND CARPETS (Modern Rugs).

WIMPLE, WIM *p'l.* See DRESS (Dress in Feudal and Gothic Times).

WINANT, WINANT, JOHN GILBERT. See NEW HAMPSHIRE (Famous Men and Women).

WINCH. See DERRICK.

WINCHELL, WINCHELL, ALEXANDER (1824-1891), was an American scientist and teacher who wrote several



Michigan Historical Collection

Alexander Winchell, American geologist and author

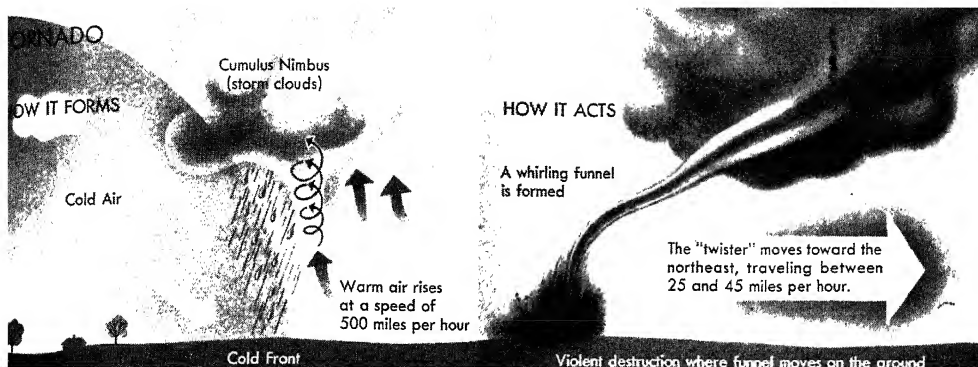
from *a Geologist's Hammer; Sketches of Creation; and The Doctrine of Evolution.*

WINCHELL, WALTER (1897-), is an American newspaperman. He played an important part in making the gossip column a regular feature in American papers. Many critics accused him of practicing "keyhole journalism," or of unethical snooping, but his column became widely read and imitated. In his column he used a type of jargon which was also widely imitated. This jargon is a colorful use of coined words and phrases such as "lohengrined" and "middle-aisled" for "married." Winchell was born in New York City and had a public-school education. He played in vaudeville before beginning to write for *The Vaudeville News* in 1922. He

His Works include *Sparks from a Geologist's Hammer; Sketches of Creation; and The Doctrine of Evolution.*



Wilt Caused by a Fungus has attacked the cucumber plant at the right. At the left is a normal, healthy cucumber vine.



became nationally known in 1929 with his syndicated column for the *New York Daily Mirror*, and later began weekly radio broadcasts.

WINCHENDON, *WIN chen dun*, Mass. See **TOY**.

WINCHESTER. See **ENGLAND** (Cities).

WINCHESTER, a rifle. See **RIFLE**.

WINCHESTER COLLEGE, at Winchester, England, is one of the oldest and most prominent public schools in the country. It was founded in 1382 by William of Wykeham, Bishop of Winchester, and was opened in 1394. The motto of the school is "Manners Makyth Man." The college was originally established for seventy poor scholars, but greater numbers were gradually admitted. It flourished until the 1700's, when a decline set in. The school was saved by the reforms of William Stanley Goddard, who became headmaster in 1796. Winchester College was one of the first public schools to introduce courses in science and mathematics in addition to the classics. I.L.K.

WIND. When the air moves, it becomes wind. Winds blow in a small way in some family kitchens every day. If there is a fire in the stove, all the air directly above is heated. This causes the molecules of the warm air to expand and take up more space. The heated air becomes lighter than the surrounding air. So it rises toward the ceiling. On all sides, cooler air presses in to fill the space above the stove, boosting the warm air on its way upward. Now, the cooler air becomes heated and joins the column of air moving upward. As the heated air reaches the ceiling, it spreads out, cools, and comes down again, helped on its downward course by the warm current that rises from the stove. Thus a circulation is established. But the current is very mild, and it may not be felt, except directly above the stove.

Causes of Wind. The circulation of warm and cold air that the kitchen stove sets up on a small scale is taking place continuously all over the earth on a large scale. We live at the bottom of a vast ocean of air whose ebb and flow are as ceaseless as the tides of the sea. The term *wind* is used in a general way to mean all these movements of the atmosphere. The example of the stove shows that difference in temperature of the air cause a difference in the weight, or pressure. It is the unequal temperature and pressure of the atmosphere over different parts of the earth that is the chief cause of wind.

The cause of wind is readily understood by a study of the general circulation of the atmosphere of the earth. The region along the equator is the hottest part of the earth's surface. The air over this belt is warmer and

lighter than that on either side, so it is forced upward by the higher pressure of the cooler air. Over the equatorial regions, then, air moves constantly upward. This current is not felt as wind, and sailors called the region the *belt of equatorial calms*. As the warm air rises, other air flows in from both sides to replace it. These currents of cooler, heavier air would be due north-south winds if the earth did not turn so fast from west to east. But the north-south air currents are constantly coming into contact with portions of the earth whose speed of rotation is greater than that of the region from which they come. Since the air is unable to get up such speed as rapidly as the solid earth, the currents lag behind. This causes them to turn a little from their straight course. In the Northern Hemisphere they turn a little toward the right (or westward) and in the Southern Hemisphere toward the left (also westward). This means that the winds blowing toward the equator to replace the rising air are from the northeast in the Northern Hemisphere and from the southeast in the Southern Hemisphere. These winds are the well-known *trade winds*.

The upward current of air over the equator finally reaches a height where the surrounding atmosphere has the same weight and temperature as the upward current. Now it spreads out and flows toward the poles. The coldness of the poles constantly cools the air above, causing it to become heavier and sink toward the surface of the earth, where it begins to flow toward the equator. To replace the air which is sinking earthward at the poles, new air must flow in above from regions nearer the equator. The currents flowing toward the equator at the surface now become northeast winds in the Northern Hemisphere and southeast winds in the Southern Hemisphere. The currents which flow toward the poles high above the surface are also turned a little off their course by the earth's rotation. In the Northern Hemisphere, they become southwest winds and in the Southern Hemisphere northwest winds. As the air moves northeastward at high levels from equatorial regions, a gradual damming up of air occurs between about 30° and 40° North latitude. This results in the development of bands of high pressure. On the pole side of these high-pressure bands, the wind blows mostly from the west near the surface. These winds are part of the *prevailing westerlies*. On the equator side of these high-pressure bands are the *trade winds*. In the center part of the high-pressure bands the air is subsiding, and there is little or no wind.

The down currents of heavy, cold air near the poles

cause a *polar anticyclone*, or high-pressure cell. As winds blow outward from the center of this high-pressure section, they are turned from a straight course to form northeast winds in the Northern Hemisphere and southeast winds in the Southern Hemisphere. These winds bring cold polar air down into the parts of the world midway between the poles and the equator. This cold air meets warm, moist air which is brought up from the tropics by the winds which blow around the high pressure bands midway between the poles and the equator. Now we have directly opposite air masses in contact with each other. On one side, there are relatively warm, light, and moist tropical air masses. On the other are cold, heavy polar air masses. The line between polar and tropical air is known to meteorologists as the *polar front*. It is along this front that the wandering cyclones and anticyclones of the Temperate Zones originate. These are the winds that bring the variable weather of winter. The warm and cold air do not mix easily, but enter into a struggle with one another. The results may be clouds, rain, snow, fog, or thunderstorms.

On the equatorial side of these zones of atmospheric unrest, trade winds usually bring good weather with clear skies.

In the region of the rising air near the equator, there is usually little wind. But sudden squalls or even severe tropical storms such as hurricanes or typhoons may occur there.

Kinds of Wind. The speed at which the air current moves, and the direction from which it moves determine what it is named and determine whether it is harmful or beneficial. A wind of twenty-eight miles an hour is classed as a *fresh breeze*, and is not harmful. When it reaches a speed of fifty-six miles an hour, it is a *strong gale*, and may cause some damage to fruit crops. At seventy-five miles an hour, it is a *windstorm* and is dangerous both to crops and property. At ninety miles an hour, when it is classed as a *hurricane*, wind is devastating in its damage to crops, property, and man himself.

The most dangerous of all winds is the *tornado*, a swirling movement of the wind in a counterclockwise direction, sometimes at more than 300 miles an hour.

The speed of a tornado has never been measured accurately, but the destruction is almost incredible. Tornadoes occur most often in the central Mississippi Valley Region of the United States. The *bora*, a cold, violent north to northeast wind, is another famous localized type of wind which sweeps across the regions surrounding the Adriatic Sea.

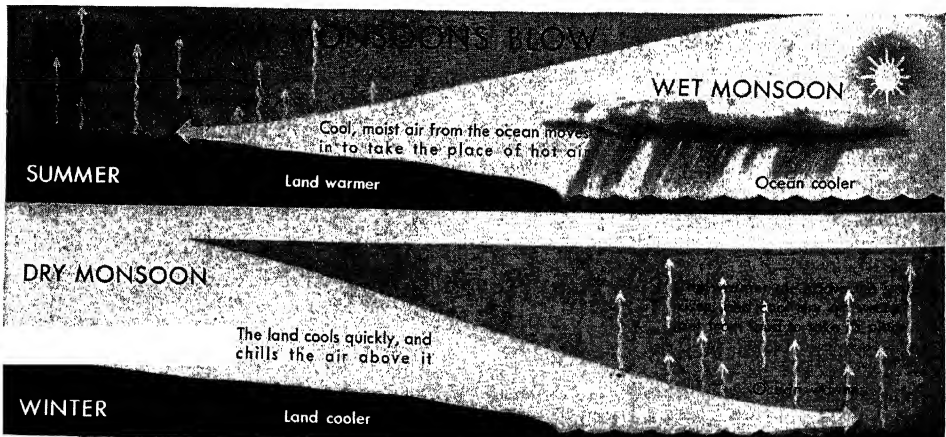
Beaufort's Wind Scale. In describing the force of wind, mariners use a scale drawn up in 1805 by Rear Admiral Sir Francis Beaufort, a famous British hydrographer. He developed a table of strength of winds based on the effect of wind on sailing ships. As steam was gradually substituted for sails, the Beaufort's scale was translated into terms more exactly suited to steam.

The following table gives the numbers of the revised Beaufort's scale, the designation of winds, and their approximate velocity in miles per hour.

BEAUFORT SCALE NUMBERS	WIND DESIGNATIONS	VELOCITY PER HOUR
0.....	Calm.....	3 miles or less
1.....	Light air.....	8
2.....	Light breeze.....	13
3.....	Gentle breeze.....	18
4.....	Moderate breeze.....	23
5.....	Fresh breeze.....	28
6.....	Strong breeze.....	34
7.....	Moderate gale.....	40
8.....	Fresh gale.....	48
9.....	Strong gale.....	56
10.....	Whole gale.....	65
11.....	Storm.....	75
12.....	Hurricane.....	90

Related Subjects. The reader is also referred to:

Air	Gale	Simoom
Anemometer	Harmattan	Sirocco
Calms, Regions of	Khamisin	Soil
Chinook	Land and Sea	Storm (with list)
Climate	Breezes	Trade Wind
Cloud	Mistral	Weather
Desert	Monsoon	(with list)
Dune	Norther	Whirlwind
Erosion	Prevailing	Zephyr
Foehn	Westerly	



WIND CAVE NATIONAL PARK. This beautiful park in the rolling hills of southwestern South Dakota surrounds one of the most unusual caves in the United States. The whistle of the wind which blows almost constantly through the cave can be heard some distance from the entrance. But when the visitor gets inside the cavern, there is little feeling of wind. The temperature remains a cool 47° F. throughout the cave, year in and year out.

Wind Cave was formed by ages of erosion, when water kept up a constant wearing away of the limestone layers through which the cave winds. These layers are from 300 to 630 feet thick. The cave itself is made up of hundreds of chambers, located from 50 to 300 feet apart and connected by winding passages.

Wind Cave has very few of the stalagmites and stalactites for which the Carlsbad Caverns and Mammoth Cave are famous. Instead, it has a series of strange boxwork and frostwork formations which are not found elsewhere in the United States. The boxwork formations are calcite crystal structures, which vary from bright yellow, through pink and rich browns, to deep blue. The frostwork is many tiny white crystals along the ceilings and walls. Under the electric lights which illuminate the entire cave the boxwork becomes a magical land of soft glowing color, and the frostwork gleams like millions of bright jewels.

The land around Wind Cave was made a national park in 1903. The park, considerably enlarged in 1946, contains approximately 23,900 acres. It is situated about ten miles from Hot Springs, S.D. The park is also a game preserve for buffalo, deer, and antelope. H.E.

WINDERMERE, *WIN der meer*, LAKE is the largest lake in England. This beautiful body of water lies in the county of Westmoreland, in northwestern England. It forms part of the famous English Lake District. The famous English poets William Wordsworth, Robert Southey, and Samuel Coleridge were greatly inspired by the scenery which surrounds Windermere Lake. Wooded hills rise as high as 1,000 feet around the lake, and blend with the distant mountains to the north and west. The small islands in the center of the lake form a picturesque group. Windermere Lake covers nearly six square miles, and is from thirty to more than 200 feet deep. Its greatest width is one mile, and it is about ten and a half miles long. The Leven River flows from Windermere Lake into Morecambe Bay. W.R.McG.

WINDFLOWER. See ANEMONE.

WINDHOEK, *VINT HOOK* (population 18,939), is the capital of South West Africa, which is a mandate governed by the Union of South Africa. Windhoek lies on a plateau 5,600 feet above sea level near the center of the country. It has a cool, dry, and pleasant climate. The city is connected by railroad with Walvis Bay on the Atlantic coast, and with cities in the Union of South Africa. H.V.B.K., Jr.

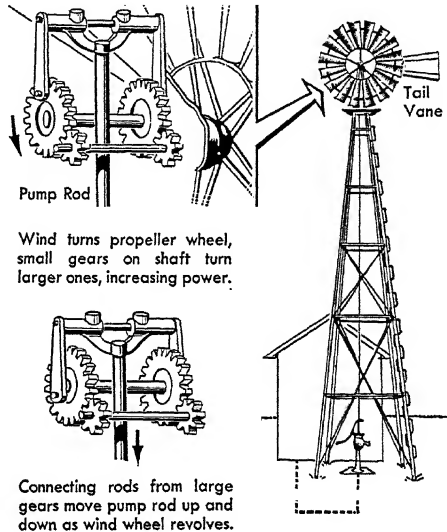
WINDHOVER, *WIND HUV er*. See KESTREL.

WIND INSTRUMENT. See MUSICAL INSTRUMENT; ORCHESTRA; SOUND (Production of Musical Sound).

WINDLASS, *WIND lah*. This simple machine is used to lift weights and pull loads. One of its most common uses is for hoisting water from wells. The windlass is a form of the wheel and axle, which raises a heavy load

by the application of a small amount of force. The simple windlass consists of a cylinder which can be turned by a crank. A rope or chain is wound around this cylinder. A bucket is firmly fastened at the end of the rope or chain. By turning the crank, the rope is wound and unwound around the cylinder and the bucket can be lowered into the well and then raised again. The windlass may be operated by mechanical power. The capstans used on docks and on shipboard are a form of windlass. So also are the drums and cables of a crane or an elevator. See also WHEEL AND AXLE. E.A.Fe.

WINDMILL. The windmill is a machine of the class known as prime movers that uses the energy of the wind to produce power. Windmills are generally used to pump water and to drive electric generators for lighting



The Windmill Uses Power of the Wind to Pump Water

and for charging storage batteries on farms. A mill for pumping water has a wheel of blades set at a common angle and mounted on a horizontal shaft. The wheel is held with its face toward the wind by a vane, or rudder. The wind strikes the blades at an angle and forces the wheel to revolve. The mill gets the full force of the wind by being mounted on a tower, twenty or more feet high above surrounding obstructions to the wind. Modern windmills are usually built of steel. The old-fashioned, picturesque Dutch windmill with its four long arms carrying cloth sails is seldom seen on American farms, and it is gradually disappearing from the countryside of The Netherlands.

Within limits, the power of windmills increases with the diameter of the wheel. But there is a practical limit in diameter over which there is little gain in power on account of the increased weight. In tests, a steel wheel eight feet in diameter developed 0.53 horsepower in a twenty-mile wind. One ten feet in diameter produced 1.06 horsepower in the same wind.

Wind electric plants have a propeller-type wheel, with two or three blades, which turns at a high speed. The wheel is usually mounted on a mast held up by guy cables. The wheel is geared to a dynamo. The sizes of wind-electric plants range from those developing 100 watts for charging a radio storage battery to those having a capacity of 2,000 watts. J.B.D.

See also HOME LIFE (color plate, Land of Dikes and Windmills).

WINDOW. Men first thought of windows as mere openings to provide light and air in a building. Only crude shutters and lattices covered them. Later, linen, oiled paper, and sometimes mica or gypsum were used for windowpanes, in addition to the wooden shutters. Glass windows began to be used in ancient Roman times.

When the great Gothic cathedrals of Europe were built in the Middle Ages, beautiful colored glass was used in their famous windows. Particularly famous were their rose windows. The windows were rich with tracery; and the glass, in small pieces, was set in lead strips. (See TRACERY.) Such windows can be seen today in many cathedrals of France and England. Some of the best are in the Cathedral of Chartres.

Small paned glass windows began to be used in palaces in the 1200's, and were common in large houses from the 1500's on. In England these windows were often very large. But in the smaller houses and farmhouses glass windows were small and rare until the

7 Today, architects plan most buildings, whether they are homes, office buildings, or factories, so that windows will let in the most daylight possible. Sometimes walls of glass blocks are used. The modern home builder seeks to provide his home with all the comfort and beauty which windows can give.

The disadvantages of having many large windows in a building is that they permit a great amount of heat to be lost during cold weather. But double-glazed glass panes which prevent this are becoming common. Methods of opening and closing windows and of ventilating rooms are constantly being improved. The design and location of windows has also become very important. Windows are placed so as to let in the sun in winter and to prevent its entrance in hot summer days, as well as to give the most beautiful views. Heavy draperies and curtains are often avoided. A feeling of much extra space can be given to a room by walls of clear glass opening on a view or garden. T.F.H.

See also STAINED GLASS; VENETIAN BLIND.

WINDOW BOX. The window box is actually a type of garden, and is particularly popular in the city to add beauty to homes. The window box can be made either of wood or metal. It should be about 8 to 12 inches wide. If the box is wooden, both the inside and outside should be coated with zinc in order to keep the wood from decaying. Painting the inside with asphaltum paint will also preserve the wood and make the box waterproof. Several holes should be drilled in the bottom to allow for drainage.

The location of the window box is very important, and depends upon the type of plants that are to be planted. Window boxes for flowering plants should be

directly exposed to the sun. Plants which are grown for their leaves, such as ferns, prefer shade.

Flowers such as the geranium, begonia, and petunia are very popular window box plants. Cactus plants and other succulents, or fleshy plants can be grown successfully in the window box. Palms and ferns are other popular plants in window boxes. Sometimes several types of plants are grown in the same box. Then the center of the box is usually planted with upright plants while the outside border may be planted with vines or drooping plants. A.C.Ho.

WINDOW TAX. See ALLENTOWN.

WINDPIPE, or TRACHEA. The windpipe of vertebrate animals is the large tube from the throat to the lungs. In man, the windpipe leads downward from the pharynx; and divides at the bottom to form the bronchial tubes. It can be felt in the front part of the neck as a line of hard ridges. The windpipe is made up of a layer of connective tissue and muscle, lined with mucous membrane. Bands of hard cartilage enclose the tube at the front and sides, and keep its walls from collapsing. The back of the windpipe rests against the esophagus.

On the surface of the mucous membrane of the windpipe is a layer of cells, each ending in a tuft of tiny threads. These delicate hairs are called *cilia*. They move back and forth all the time. The work of the cilia is to carry dust particles and bits of mucus away from the lungs.

The larynx, or voice box, is at the top of the windpipe, where it leads from the pharynx. It is easy to feel this cartilage box at the front of the neck. Air passing over the vocal cords in the larynx forms the voice. Birds have their vocal organ, the *syrix*, at the bottom of the windpipe. A.B.H.

See also CARTILAGE; CILIA; LARYNX; LUNG; THROAT.

WIND RIVER RANGE. See WYOMING (The Land).

WINDSOR, WIN *zer*, is the name of the present royal family of Great Britain. It was formally adopted by proclamation on July 17, 1917. It replaced the name of Saxe-Coburg-Gotha, which was abandoned during World War I because it was German. The name Windsor was taken from Windsor Castle, which has been a royal residence since the time of Edward III.

The Windsor family history is a confused web of interfamily and international marriages. The first British king of the direct Windsor line was George I of the House of Hanover. The name of the family was Hanover until the time of Queen Victoria. This name came from the Electorate of Hanover, in Germany, which the British kings also ruled. The last Hanoverian king was William IV, Victoria's uncle. The laws of Hanover did not permit a woman ruler, and when Victoria became Queen of Great Britain the Electorate of Hanover passed from the British royal family to Ernest Augustus, brother of William IV.

Saxe-Coburg-Gotha before the World War I was a duchy in Saxony held by the Wettin family. One of the daughters of Duke Francis, the ruler of the duchy, was married to the Duke of Kent, son of George III of Great Britain. This daughter was Victoria's mother.

In 1826 the Saxon lands were redivided. Ernest, son of Duke Francis, exchanged Saalfeld for Gotha and founded the house of Saxe-Coburg-Gotha. Ernest had

two sons, Ernest II and Albert, who were first cousins of Victoria. Albert married Victoria in 1840. Victoria's children took their father's name, and Edward VII, her son, was the first English king to bear the name of Saxe-Coburg-Gotha. His son George V was the first to use the name of Windsor.

A.R., Jr.

See also EDWARD (VII, VIII, England); GEORGE (England); VICTORIA; WINDSOR CASTLE.

WINDSOR, Ontario (population 105,311). This city is often called "The Southern Gateway to Canada." Windsor lies on the southeast bank of the Detroit River directly opposite Detroit, Mich. The Canadian and American cities are connected by ferries, two tunnels, and a suspension bridge. Windsor is the eighth largest city in Canada, and ranks fourth in industrial importance.

Windsor's location on the International Border places the city close to the natural resources and excellent transportation of the central part of the North American continent. Since 1900 Windsor has become the home of the Canadian branches of several American manufacturing firms. Windsor is often called "The Detroit of Canada." Like Detroit, its chief products are automobiles and auto accessories. The city also has a large distillery, a chemical manufacturing plant, a saltworks, and a cereal plant.

The first settlement on the site of Windsor grew up during the early 1800's. The community was known variously as The Ferry, Richmond, and South Detroit.

In 1836 it was renamed Windsor after an English town. Windsor was incorporated as a city in 1892. In 1935 Windsor annexed the "border cities" of Sandwich, Walkerville, and East Windsor (Ford City). G.W.B.R.

WINDSOR, DUKE OF. See EDWARD (VIII, England).

WINDSOR, WALLIS (WARFIELD), DUCHESS OF. See EDWARD (VIII, England).

WINDSOR CASTLE is the chief residence of the rulers of Great Britain. It stands at Windsor, in Berkshire, twenty-one miles west of London. William the Conqueror chose the site and built a castle here. This castle was torn down by Edward III, who began the present structure. Later kings added to the castle until it now covers about twenty-four acres. The castle stands in the Little Park, which joins the Great Park south of Windsor. In the Little Park is the tomb of Queen Victoria and Prince Albert.

The most important feature of the castle is the round tower, or *keep*, which dates from the time of Edward III. It is eighty feet high, and can be seen from far away. Four other towers also rise from the walls.

The section west of the central tower is called the Lower Ward. It contains Saint George's Chapel, begun by Edward IV and finished by Henry VIII. In the chapel vault lie the bodies of Henry VIII, Charles I, George III, William IV, George V, and other English rulers. The beautiful Albert Memorial Chapel also stands in the Lower Ward. Henry III began this chapel,



Burton Holmes, Ewing Galloway

The Round Tower of Windsor Castle Seen through the Gates of the Historic Old Structure

Henry VII rebuilt it, and Queen Victoria completed it in splendid style in memory of her husband. King Edward VII was buried here in 1910.

The Upper Ward, to the east, contains the royal apartments and great state rooms. These were built chiefly during the reigns of George IV, William IV, and Victoria. The rooms are furnished in magnificent style and house a valuable collection of paintings and drawings. T.F.H.

WIND TUNNEL is a device which produces an artificial wind or stream of air. It is used to determine the effect of wind pressure on objects such as airplanes and automobiles. The wind tunnel is particularly useful in the design of airplanes.

Before an airplane is built, engineers make a model of the plane. This model is usually exact to one thousandth of an inch. When the engineers are ready to determine the characteristics of the plane, the model is placed in the wind tunnel. The wind tunnel has a large section, and a smaller section known as the *throat*. In the large section there is a propeller, which blows air at a certain velocity into the throat. The airplane model is placed in the throat. It is placed on supports which rest on very sensitive balances. The wind, which is created by the propeller, blows against the model at a great speed. Tests are then made to show how the actual plane will react when it is in the air at the corresponding speed. The speeds of the wind tunnel are controlled by the operator, who records the reactions of the plane. The engineer is then able to determine the flying characteristics of that particular plane. In this way it is possible to eliminate many errors in design before the plane is actually built.

Wind tunnels have been built to test model airplanes at speeds as high as 750 miles per hour, which is the speed of sound. This type of wind tunnel is used to test jet-propelled airplanes. Wind tunnels have also been built to test planes at speeds higher than the speed of sound. These speeds are known as supersonic speeds. They have been known to go as high as 3,000 miles per hour, which is four times the speed of sound. E.A.Fg.

WINDWARD ISLANDS. These islands are part of the British West Indies. The group stretches around the eastern end of the Caribbean Sea like stepping stones to South America. The Windward Islands received their name from their location, for they are more exposed to trade winds than their neighbors, the Leeward Islands. The Windward group includes the islands of Dominica, St. Lucia, St. Vincent, Grenada, and a cluster of small islands called the Grenadines. The entire group covers an area of 821 square miles, and has a population of 314,740. The chief products of the islands include cacao, nutmeg, sugar, bananas, cotton, and arrowroot.

The Windward Islands are governed as four separate colonies called St. Lucia, St. Vincent, Grenada, and Dominica. Each colony has its own local government, but all four are under the control of the same governor. St. George's (population 6,000), on Grenada island, is the capital of the Windward Islands.

In 1940 the island of St. Lucia became the site of two American air bases. The United States leased the land for these bases from Great Britain. E.E.Ei.

See also SAINT VINCENT.

WINDWARD PASSAGE is a ship's channel between Cuba and Hispaniola, an island of the West Indies. It is about fifty miles wide and connects the Atlantic Ocean with the Caribbean Sea. The Windward Passage is also known as the Windward Channel.

WINE. The knowledge of wine making is so old that no one knows who the first wine makers were. We do know that the Egyptians knew how to make wine early in their civilization.

Wine had a more practical reason in its beginning than the mere pleasure of drinking. Ancient peoples had little pure water to drink, and they learned that alcohol formed by fermentation protected fruit juice from spoiling. The people who drank this fermented juice, or wine, did not get sick so often as those who drank the impure water. This reason for wine drinking continues down to our day in many parts of the world. Many peoples, especially those of the Latin countries, take wine as part of their regular diet and use it instead of water for drinking.

Poets have sung the praises of wine throughout the ages. Homer, Pliny, and Shakespeare wrote of the friendliness of wine. Omar Khayyâm painted an immortal picture of contentment with his verse in the *Rubâiyât*, "A loaf of bread, a jug of wine, and thou." The Bible has many references to wine. Many of these warn of the intoxicating powers of wine. One such reference is, "Look not upon the wine when it is red, when it giveth his color in a cup . . . at the last it biteth like a serpent, and stingeth like an adder." (Prov. 23:31-32.) Again, the Bible says "Wine is a mocker, strong drink is raging." (Prov. 20:1.)

The Greek God, Dionysus (called Bacchus by the Romans), was not only the god of wine, but also was looked on as the god of good living, a lawgiver, and a promoter of civilization. Wine also has come down through the ages as part of religious celebrations such as the Roman Catholic Mass, Jewish services, and some Protestant communions.

Many wines are named for the places in which they first became famous. Spain, France, Italy, and the Rhine Valley in Germany are the greatest wine centers in Europe. California is now the greatest wine-producing region in the world. New York, Michigan, and Ohio also make a number of good wines.

How Wine Is Made. Wine is the fermented juice of the grape or some other fruit. Some fruit juice ferments easily because it already contains sugar. The most widely used fruits include the grape, apple, cherry, and blackberry. Wine falls into two general groups, *dry* and *sweet*, depending on the taste and the percentage of sugar remaining or added after fermentation.

Wine grapes are crushed between two cylinders set far enough apart that they do not crush the seeds. The *must*, or juice from the crushing, is run into vats which hold from 25 to 100 barrels. The juice is then allowed to ferment the length of time needed for the type of wine wanted. The first must that flows from the crushed fruit makes the choicest wines, and is drawn off first. When the fermentation has gone on to the stage desired, the wine is drawn off into casks called *tuns*. It remains in these casks until it is suitable for drinking. It is in this stage that the chemical changes take place which fix the *bouquet*, or flavor and aroma of the wine.

Dry wines are made by allowing most of the sugar to turn into alcohol. The sweetness of sweet wines comes from the sugar allowed to remain in the wine.

Types of Wine. Wines are classified according to strength and appearance. *Light* wines contain from 8 to 14 per cent alcohol. They are red or white and are either *still* or *sparkling*, depending on whether they contain natural carbon dioxide or not. Carbon dioxide is the gas that forms during fermentation and makes sparkling wines bubble. The gas is allowed to escape from still wines before they are bottled.

Claret is a still wine with a rich ruby color. It contains from 12 to 14 per cent of alcohol. It was first made in the French province of Bordeaux, which has long been famous for many types of wines. Other still wines include Burgundy, Chianti, Rhine, Sauterne, and Moselle. Burgundy and Moselle are also produced as sparkling wines by bottling the wine before the carbon dioxide gas escapes. The most famous of sparkling wines is champagne, which is named for the French province where it was first produced. It is pale amber in color and contains about 12 per cent alcohol. A fine American sparkling wine is called Catawba, for the grape from which it is made.

Fortified wines are those in which spirits, usually brandy, are added to increase the strength, or alcoholic content. Sherry, one of the best known of this type, came originally from Jerez, Spain. It is amber colored, and contains from 18 to 21 per cent alcohol. There are both dry and sweet kinds of sherry. The most famous kinds of Spanish sherry are amontillado and manzanilla. Other fortified wines are port from Oporto in Portugal, Marsala from Sicily, Malaga from Spain, Tokay from Hungary, Madeira from the islands of the same name, and muscatel.

French and Italian vermouth, and Dubonnet are fortified wines to which aromatic herbs and spices have been added. These are called *aromatized* wines.

How Wine Is Served. Many persons prefer to serve only one wine with a meal, usually a red or white dry wine. When a number of wines are served with a formal dinner, they are served in the following manner. Dry sherry is served with the appetizer or soup. Any dry white wine goes well with oysters or fish. Meat courses are best accompanied by any dry red wine. A dry white wine should be served with creamed dishes. Burgundy is a favorite beverage with fowl or game. Port is usually served with cheese before dessert. A sparkling or sweet wine is good for dessert.

Wine should be served in stemmed glasses which range in size from a small glass for port to the wide-brimmed champagne glass. Sparkling wines and some dry white wines are chilled. Most others are served at near room temperature. J.B.R.

See also CHAMPAGNE; GRAPE.

WINFRID. See BONIFACE, SAINT; CHRISTMAS (Origin of Christmas Tree).

WING. See AIR FORCE (Air Operations); AIRPLANE (Kinds of Airplanes); BEE (Wings); BIRD (illustration, Types of Wings); INSECT (Organs for Moving About [Wings]).

WINGATE'S RAIDERS were British commandos who fought behind Japanese lines in Burma during World

War II. The leader of the Raiders was British Major General Orde Charles Wingate. He built his fighting force from mixed native and British troops.

General Wingate organized his commandos in 1941, at the request of Field Marshall Archibald Wavell. Within a few months, the well-trained Raiders began to slice behind Japanese lines. They cut railroad lines, blew up bridges, and destroyed Japanese military installations.

Early in 1944 a large force of Raiders seized important positions in Burma. American troops built an airfield behind Japanese lines and flew in necessary military supplies to the Raiders. By the summer of 1944 the Raiders had penetrated deep into Japanese-held territory. They cut the Burma railroad between Myitkyna and Katha, and supported General Joseph W. Stilwell's Burma advance. General Wingate died in an airplane crash in April, 1944, but his Raiders continued their fight against the Japanese. F.S.M.

See also COMMANDO; RANGER.

WINGED BULL. A strange creature with the head of a man and the body of a bull, and with wings on its shoulders, is found in Assyrian sculpture. These winged bulls first appeared about 1000 B.C. They were placed in pairs at the entrance to an Assyrian palace to frighten away evil spirits. Some winged bulls are seventeen feet high. They have five legs, so that from the side they appear to be walking, while from the front they appear to stand still. The Persians later erected similar figures at their palace gates. F.Ho.

WINGED LION. This is an imaginary creature found mainly in the art of Babylonia and Assyria. It is represented as a figure with the head of a man, the wings of an eagle, and the body of a lion. Winged lions, like winged bulls, were often placed in pairs at the entrance gate of a king's palace. They were supposed to frighten away enemies or evil spirits. The sculptors carved the lions with five legs. From the side they appear to be walking, but from the front they seem to be standing still. A much later example of a winged lion is the one which still stands today in Saint Mark's Square in Venice, Italy. F.Ho.

WINGED PEA. See TREFOIL.

WINGED VICTORY, or NIKE, NI kee, OF SAMO-THRACE, SAM oh thrays, is a wonderful Greek statue which stands in the Louvre Museum in Paris. The Winged Victory was found in 1863 on the island of Samothrace in the Aegean Sea. When it was found, the statue was in many fragments, but they were later pieced together. The statue was one of many set up by the Greeks to honor Nike, goddess of victory and messenger of Zeus and Athene. It is not known who made the statue, or when. Some scholars place its date around 300 B.C., while others state that it is a work of the 100's B.C. It is one of the finest examples of the sculpture of the Hellenistic period. F.Ho.

WINGLESS VICTORY. See ACROPOLIS.

WINKELRIED, VING kel reet, ARNOLD VON, is the legendary national hero of Switzerland. Switzerland is supposed to have won its independence through his bravery. In 1386 the Swiss were fighting the Austrians at Sempach and were beginning to fall back. According to the story, Arnold von Winkelried then dashed boldly

into the Austrian ranks and made his body a target. The Austrians drove their spears into him and then broke ranks before his charge. The Swiss rushed through the break in the lines and drove back the enemy in hand-to-hand fighting.

H.A.M.Y.

WINNEBAGO, *WIN ee BAH goh*. See INDIAN, AMERICAN (Table of Tribes).

WINNEPESAUKEE, *WIN ee pee SAW kee*, **LAKE**. This beautiful lake in east-central New Hampshire attracts many summer visitors because of its charming scenery. The lake is about sixteen miles long and six miles wide. It contains more than 200 islands.

L.D., JR.

WINNETKA PLAN is a name sometimes given to a philosophy of education developed in the public elementary and junior-high schools of Winnetka, Ill., after about 1919. Its influence has been widely felt in the growth of the progressive education movement. According to the plan, teachers deal with each pupil individually so that each can develop his own particular abilities at his own rate of speed. Pupils work alone in their regular studies, but take part in many group activities in which their achievements are not measured.

WINNIPEG, Manitoba (population 221,960), is the capital of its province and the fourth largest city in Canada. The city was named for Lake Winnipeg, which lies forty-five miles to the north. Winnipeg is a Cree Indian word meaning *The Water*.

Winnipeg is one of the great railway centers of North America. In it are the largest individual railway yards in the world, those of the Canadian Pacific Railway. The Winnipeg Grain Exchange is the center of the Canadian wheat market. The Winnipeg stockyards are the largest in Canada.

Location and Description. Winnipeg lies at the meeting point of the Red and Assiniboine rivers. It is about halfway between Lake Winnipeg and the International Border. Minneapolis, Minn., lies about 450 miles southeast of Winnipeg.

The two chief streets of Winnipeg are Main Street and Portage Avenue, which run roughly parallel to the two rivers. Main Street runs north and south and is crossed by Portage Avenue, the widest street in Canada. The Mall is a landscaped section in which are located the provincial legislative buildings, the law courts, some of the buildings of the University of Manitoba, and a cenotaph war memorial. Wellington Crescent is a beautiful driveway along the Assiniboine River.

Winnipeg has many residential districts and suburbs, including Fort Rouge, Crescentwood, River Heights, Armstrong's Point, Tuxedo, and Elm Park. Near by are the city of Saint Boniface and the towns of Fort Garry, Saint James, and East, West, and North Kildonan. These are part of the Greater Winnipeg area (population 290,540).



The Canadian National Railways Station in Winnipeg, Manitoba's Capital and Canada's Chief Railroad Center

Sawders, Combine

Winnipeg has thirty-two public parks and squares and thirteen golf courses. Assiniboine Park (282 acres) is the largest park. The city also has an auditorium, a museum, an art gallery, and an excellent public school and library system.

Industry. Winnipeg has more than 700 factories which make about \$160,000,000 worth of various products every year. These factories make use of the very cheap electric power furnished by dams and turbines on the Winnipeg River. The chief industrial plants of Winnipeg are flour mills, grain elevators, and meat-packing establishments. Other leading manufactures of the city include wood products, structural steel, bricks, boilers, tractors, and other farm machinery, tents, cement, butter, and candy.

Transportation. Winnipeg is served by the two transcontinental Canadian railways and branch lines leading in all directions. The lines of three United States railroads cross the International Border into Winnipeg. The city has steamer connection with Norway House at the opposite end of Lake Winnipeg, 350 miles to the north. Norway House, a historic old Hudson's Bay post, is a supply center for the northern fur-trading and mining regions. Winnipeg is the central airport of the Trans-Canada Airlines, and has routes leading to all parts of Canada and the United States.

History. The first establishment on the site of Winnipeg was Fort Rouge, built by the Sieur de la Vérendrye in 1738. In 1811 the Earl of Selkirk brought Scottish settlers to the Red River Valley. They founded a permanent settlement, although not until they had suffered much from the rivalry between two fur-trading companies. These were the Northwest Company, which had built Fort Gibraltar near the site of Fort Rouge, and the Hudson's Bay Company, which had established Fort Douglas about a mile to the north. The two companies were combined in 1821, and Fort Gibraltar was renamed Fort Garry. This fort was rebuilt in 1835, but only the stone gateway remains today. Another Fort Garry was built in 1835 about twenty miles down the river. This fort, called "the Lower Fort," is now maintained as a historical museum. The Upper Fort was the headquarters of Louis Riel during the disturbances among the French in 1870.

Winnipeg was incorporated as a city in 1873. After the Canadian Pacific Railway was completed in 1886, Winnipeg became a great distributing center for Western Canada.

A.R.M.L.

Questions

Where does the name *Winnipeg* come from?

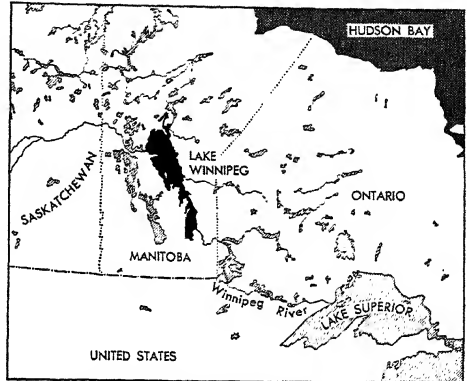
What street in this city is the widest street in Canada?

What are Winnipeg's chief manufactured products?

When was the first settlement made on the site of Winnipeg?

WINNIPEG, LAKE, is the third largest lake entirely within the borders of Canada. Only Great Bear and Great Slave lakes in the Canadian Northwest Territories are larger than Lake Winnipeg. The lake is in the south-central part of the province of Manitoba, forty-five miles north of the city of Winnipeg. It lies 710 feet above sea level, and has an area of 9,459 square miles. Lake Winnipeg is 260 miles long, and from twenty to sixty miles

wide. It is widest at the northern end. In ancient times lakes Winnipegosis, Manitoba, and Winnipeg were all part of one huge body of water, Lake Agassiz, which was formed by glaciers during the Ice Age. All three lakes are shallow, and the greatest depth of Lake Winnipeg is not more than seventy feet. There are several large



Location Map of Lake Winnipeg and the Winnipeg River

islands in the lake. These include Reindeer Island (70 square miles), and Big Island (60 square miles). The fisheries on Lake Winnipeg are the most important in the province of Manitoba. The fish are shipped to markets in Canada and the United States.

Lake Winnipeg is a storage reservoir for the waters of one of North America's great river systems, the Saskatchewan-Nelson. This system drains 370,000 square miles. The largest branch of the system is the Saskatchewan River. The Red River and the Winnipeg River are next in importance. A power project that supplies the city of Winnipeg has been built on the Winnipeg River. The Nelson River begins from the north end of Lake Winnipeg, and flows into Hudson Bay.

L.D., Jr.

WINNIPEGOSIS, *WIN ih pee GO sis*, **LAKE**, once known as LAKE WINNIPEGOS, lies in the southwestern part of the Canadian province of Manitoba. Lake Winnipegosis is directly west of Lake Winnipeg, and northwest of Lake Manitoba. The lake drains into Lake Manitoba through Waterhen Lake and Waterhen River. Lake Winnipegosis has an area of 2,086 square miles. The lake is shaped almost like the figure 7. Its greatest width is from east to west across the northern end. Winnipegosis is 122 miles long, and its greatest width is about twenty miles. Its greatest known depth is thirty-eight feet. Only small boats can sail on the lake.

In glacial and prehistoric times, Lakes Winnipegosis, Manitoba, and Winnipeg formed a huge single sheet of water, which geologists now know as Lake Agassiz. Lake Winnipegosis was discovered in 1735 by the French-Canadian explorer Pierre de Varennes, the Sieur de la Vérendrye (1685-1749).

L.D., Jr.

See also AGASSIZ, LAKE.

WINNIPEG RIVER. This large stream in Canada forms part of the Saskatchewan-Nelson River system. It rises near Savanne in western Ontario and flows westward. In various parts of the region the stream is called the

Savanne, the Seine, and the Rainy until it reaches the Lake of the Woods. The stream leaves the lake as the Winnipeg River. The river then flows northwest almost to the Manitoba boundary. Here it meets the English River, its most important branch. The Winnipeg River then empties into the southern end of Lake Winnipeg. Its total length is 140 miles.

L.D., JR.

WINONA, Minn. (population 22,490). This manufacturing and trading center lies along the Mississippi River in southeastern Minnesota. It is surrounded on three sides by Minnesota bluffs, and faced by Wisconsin hills across the Mississippi. Winona is about 100 miles southeast of St. Paul. The city is named for a Sioux Indian girl about whom a tragic legend is told. The name *Winona* is given to every first-born girl in a Sioux family. Winona has about eighty manufacturing plants making nearly as many different products. The city is a shipping point for grain and vegetables grown in the farming region about it. Winona is the home of Winona State Teachers College, Saint Mary's College, and the College of Saint Theresa. Winona was founded in 1851 as a Mississippi river port. The town developed into a lumbering and wheat-shipping center, and at one time boasted that it had more millionaires than any other city of its size in the United States.

G.L.N.

WINSLOW, JOHN ANCRUM (1811-1873). See **ALABAMA** (the ship).

WINSOR DAM, sometimes called **QUABBIN DAM**, is a water-supply project on the Swift River in western Massachusetts. It is 170 feet high, with a top length of 2,640 feet. The dam controls a volume of 4,000,000 cubic yards of water. Winsor Dam was built by the Metropolitan Water District of Massachusetts. It was completed in 1939. Quabbin Reservoir, behind Winsor Dam, is the main water supply for the city of Boston. It was built in 1937, and has a storage capacity of 415,000,000,000 gallons of water. See also **DAM**.

WINSTON-SALEM, N.C. (population 79,815), is a world center of the tobacco business. The city has one of the largest tobacco-manufacturing plants in the world and one of the largest leaf tobacco markets. Winston-Salem lies in northwestern North Carolina about thirty miles from the Blue Ridge Mountains. Manufactures of Winston-Salem include men's and boy's underwear, hosiery, furniture, air-conditioning machinery, tin foil, nicotine sulfate, and swimming suits. Salem, the older part of the city, was founded in 1766 by a group of Moravians. Winston was founded in 1849 as the county seat of Forsyth County. Winston and Salem were consolidated in 1913.

C.C.R.

WINTER is one of the four seasons of the year. In the northern half of the world, winter includes the months of December, January, and February. During this time the weather is cold and the days are short. This is because of the path the earth takes as it revolves around the sun. The earth completely revolves around the sun during one year. The axis of the earth is always tipped $23\frac{1}{2}$ degrees toward the direction of its path. On December 22, the rays of the sun fall directly over the farthest point south of the equator. This day is considered the first day of winter in the Northern Hemisphere. In the Southern Hemisphere, winter begins in June.

The winter season changes according to the region. For example, in the polar regions, winter takes up half of the year. In the Temperate Zones winter takes up about one quarter of the year.

G.H.M.

See also **BLIZZARD**; **DECEMBER**; **FEBRUARY**; **HOMELIFE** (color plates); **JANUARY**.

WINTERBERRY is the name of a shrub that belongs to the same family as the holly. Many winterberries grow on swampy land in the eastern United States. The winterberry is sometimes known as the *black alder*, or *deciduous holly*. It grows six to twelve feet tall. Its attractive bright red berries appear in November. The branches of the winterberry, loaded with berries, are popular as winter house decorations. If winterberry wreaths are properly dried, they will keep their bright color for a long time. The bark is said to have some value in medicine.

J.J.L.

Classification. The winterberry belongs to the family *Aquifoliaceae*. Its botanical name is *Ilex verticillata*.

WINTERBLOOM. See **WITCH HAZEL**.

WINTER CHIP BIRD, or **WINTER CHIPPY**. See **SPARROW**.

WINTERGREEN is a hardy woodland plant that bears flowers. It grows in almost all parts of the Northern Hemisphere. It received its name because its leaves remain green all winter. The wintergreen is a very low shrub with creeping or subterranean stems. Its leaves are glossy and oval, and cluster at the top of short, erect, reddish branches. The white flowers are shaped like urns and are very attractive. They are difficult to see, however, because they are hidden under the leaves. The plant also produces a bright red berry. Birds feed on these berries during the winter. Wintergreen gives us a pleasant-smelling, pleasant-tasting oil. This oil is widely used as a flavoring for candy, medicine, chewing gum, tooth powder, and similar preparations. It is also used as a lotion.

H.N.M.

Classification. Wintergreen belongs to the heath family, *Ericaceae*. Its botanical name is *Gaultheria procumbens*. Many other plants are also called wintergreen, especially the members of the genus *Pyrola* of the *Pyrolaceae* family.



Keystone

Leaves, Flowers, and Berries of the Wintergreen

WINTER HAVEN, Fla. See UNITED STATES OF AMERICA (color plate, Landscaped Gardens [Cypress Gardens]).

WINTERPALACE. See LENINGRAD (Famous Buildings).

WINTER PARK, Fla. (population 4,715), is often called "the town that has become a university." Most of the activities of Winter Park center around Rollins College. The town lies around six lakes about four miles northeast of Orlando. Winter Park was founded as Lakeview in 1858. Its name was changed to Osceola in 1870, and to Winter Park in 1881, when a group of residents from New England laid out a new townsite. Rollins College was founded at Winter Park in 1885. The town still has a New England appearance. Winter Park is surrounded by groves of citrus trees, and has one packing plant devoted to the processing of citrus fruits.

K.T.A.

WINTER SLEEP. See HIBERNATION.

WINTER SPORTS. See CURLING; ICE HOCKEY; ICE YACHTING; SKATING; SKIING; TOBOGGANING.

WINTER'S TALE. See SHAKESPEARE, WILLIAM (Table).

WINTHROP, JOHN (1606-1676). See CONNECTICUT (Settlement and Colonial Days).

WINTHROP, JOHN (1588-1649), was a Puritan leader who became the first governor of the Massachusetts Bay Colony. His *Journal*, also called *History of New England*, is considered one of the most valuable source books in American history.



Brown Bros.

John Winthrop was the first governor of the Massachusetts Bay Colony.

Winthrop was born at Edwardstone, Suffolk, England. His family was well-to-do. He was educated at Cambridge University and later studied law. Winthrop became a successful lawyer in London, but he was not happy there. From boyhood he had been interested in the Puritan faith and he felt that he should be with the colonists in America. In 1629 he decided to move to New England with his family. He became associated with the

Massachusetts Bay Company and was appointed governor of their new colony. In June, 1630, he arrived at Salem, Mass., with eleven ships and about 700 colonists.

Winthrop was one of the founders of Boston. He was re-elected governor after his term ended and served in that position or as deputy-governor for the rest of his life. In 1643 he organized the New England Confederation and served as its first president.

T.P.A.

See also NEW ENGLAND CONFEDERATION; STATUARY HALL.

WINTHROP COLLEGE is a state-controlled school for women at Rock Hill, S.C. It is also called the South Carolina College for Women. The school has departments of liberal arts and sciences, music, home economics, physical education, and commerce. Limited work scholarships are available. Winthrop College was founded in 1886 and has an average enrollment of about 1,600.

H.R.S.

WIRE is a long, thin, flexible metal rod which has a great number of uses. Only metals which can be drawn out, or *ductile* metals, are used for making wire. The chief ductile metals are copper, iron, brass, platinum, gold, silver, and aluminum.

How Wire Is Made. From early ages until the 1300's, wire was made by hammering metal into plates. These plates were then cut into strips and rounded by beating. Then crude methods of "drawing" wire were introduced. Machine-drawn wire was first made in England in the middle 1800's. Machines have now entirely replaced hand labor. Steel or iron billets are rolled, and come out as long rods about a quarter of an inch thick. The rods are wound on reels while still hot, and are cleansed in sulfuric acid and water.

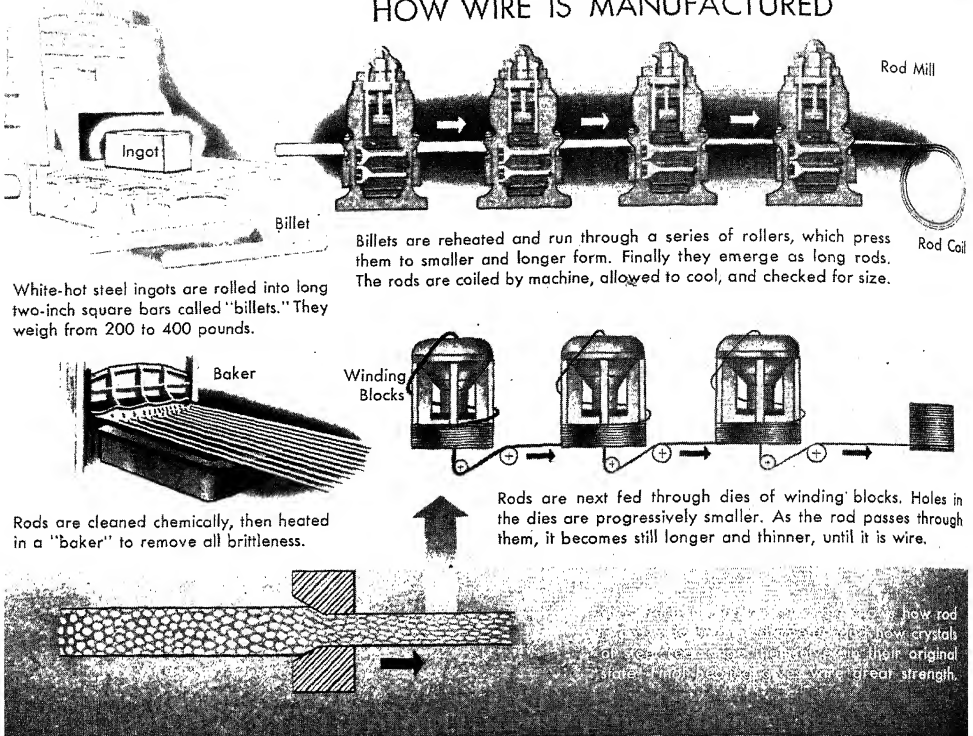
The wire is drawn thin by forcing the rods through a series of steel dies. The die is shaped like a funnel with a round opening smaller than the rod. The rod is sharpened at one end by hammering, so it may be run into the die as thread is run through the eye of a needle. As soon as the sharpened end is passed through the die, it is seized with a pair of pincers and drawn far enough to be attached to an upright drum. The drum is set in motion, pulling the wire through the die and winding it on the drum. Wire has a tendency to harden when it is drawn. It is therefore softened and made less brittle by being placed in cast-iron pots in great heat. This is called *annealing*. Each time wire is annealed, it has a tendency to scale, and so is placed in an acid bath for cleaning. Wire used for nails is not softened in this way. Wire for steel cables is hardened and tempered before it is drawn. For drawing the finest kinds of wire, extremely hard dies made of diamonds and rubies are used.

Sizes of Wire. The size of wire differs according to its gauge, or diameter. *American*, or *Brown and Sharpe*, is the standard gauge used in the United States. This gauge varies from Number 000000, which is 0.58 inch in diameter, to Number 36, which is .005 inch. There are a number of other United States standards. Sometimes the Imperial gauge of England is used. France and Germany use gauges based on the millimeter. The shape of wire may be square, oval, flat, or triangular, to meet special requirements, but most wire for ordinary use is round.

Uses of Wire. Telegraph, telephone and trolley wires are made of copper, which is very ductile and one of the best conductors of electricity. The extremely thin wires used in telescopes are made of platinum. These have been drawn out to a thinness of one fifty-thousandth of an inch. Other important uses of wire are for making nails, fences, delicate watchsprings, screens, and strings for musical and scientific instruments. Wire netting, gauze, and cloth are woven from wires. Wire ropes and cables are made from a number of single wires twisted together. Large suspension bridges are supported by wire cables. Each cable is made of thousands of separate wires which have been twisted together for flexibility and strength. Steel cables have been made which can support great burdens, some weighing as much as 130 tons to the square inch.

Much of the wire for fencing cattle is *barbed*. Barbed wire is made of two or more wires twisted together with thornlike barbs at frequent intervals, or of a single wire

HOW WIRE IS MANUFACTURED



White-hot steel ingots are rolled into long two-inch square bars called "billets." They weigh from 200 to 400 pounds.

Rods are cleaned chemically, then heated in a "baker" to remove all brittleness.

Billets are reheated and run through a series of rollers, which press them to smaller and longer form. Finally they emerge as long rods. The rods are coiled by machine, allowed to cool, and checked for size.

Rods are next fed through dies of winding blocks. Holes in the dies are progressively smaller. As the rod passes through them, it becomes still longer and thinner, until it is wire.

with sharp points. Much of the wire used outdoors is *galvanized* for protection against rust. W.R.W., Jr.

See also **ANNEALING**; **DUCTILITY**; **GALVANIZED IRON**; **WIRE GLASS**; **WIRE RECORDER**.

WIRE GLASS consists of sheets of glass from one-fourth to three-fourths inch thick in which wire mesh has been embedded during the manufacturing process. The wire mesh strengthens the glass and holds it in place after breakage occurs. It is used extensively for windows and doors. The invention of wire glass is attributed to two men, Frank Shuman of Philadelphia and Leon Appert of France. They achieved practically the same result by different processes. The Appert process consists of rolling one sheet of glass, laying the meshed wire on it, and then rolling another sheet of glass on the top, pressing the wire and the sheets of glass into one solid sheet. The Shuman process consists of rolling one sheet of glass, into which the wire netting is pressed and rolled. Wire glass is also made by placing the wire on a casting table and holding it in position while the glass is poured around it. One surface of wire glass is always smooth, and the other may be figured with various designs to diffuse light and obscure vision. Wire glass is usually one-fourth inch thick. W.C.H.

WIRE GRASS is a slender-stemmed meadow grass which is common in the United States and Canada.

WIRE-HAIRED FOX TERRIER. See **Dog** (color plate, Terriers).

WIRELESS TELEGRAPH. See **MARCONI**, **GUGLIELMO**; **RADIO** (Radiotelegraphy; History); **RADIOGRAM**; **TELEGRAPH** (Other Important Uses of Telegraphy).

WIRELESS TELEPHONE. See **RADIO** (Radiotelephony).

WIRE RECORDER is a device which records and plays back sounds, such as speech or music, when the pattern of sound waves is impressed on a steel wire. The modern wire recorder was developed during World War II by Marvin Camras at the Armour Research Foundation in Chicago. But as early as 1898 a Danish inventor, Valdemar Poulsen, first experimented with such a recorder. The wire recorder consists of a microphone which is connected through an amplifier to an electromagnet. Between the two poles of the magnet there is a small air space. A long, thin steel wire is passed between these poles. This wire has approximately the same diameter as that of a human hair. The wire is wound on two spools the size of doughnuts. The wire is slowly uncoiled and travels in the air gap between the two poles of the magnet. The sound waves strike the microphone and cause the diaphragm in the microphone to vibrate according to the frequency of the sounds. The vibration of the diaphragm sets up an electric current in the microphone circuit which has the same frequency as the original sound waves. The electric impulses, which are changed from sound impulses by the microphone, are then enlarged, or amplified, by an amplifier. The amplifier is connected to the electromagnet. This varying current sets up a varying magnetic field in the magnet which changes as the current changes. As the wire passes through the gap in the magnet, parts of it become magnetized more than others, the degree of magnetization being directly proportional to the original intensity of sound, and to the intensity of magnetism of

WIRE RECORDER

the magnet at the instant that that particular part of the wire is passing through the magnetic gap.

This wire can then be played back by unwinding the wire between the poles of the magnet. This sets up an electric current in the magnet which is changed into sound impulses by an amplifier and loud-speaker.

It is possible to erase what has been recorded by simply demagnetizing the steel wire, and the instrument has a provision for doing this. The device has many commercial advantages. Instead of using a dictaphone, it is possible to dictate directly into a wire recorder. The record can then be played back for typing, erased, and used over and over again. The wire recorder is very faithful in its reproduction of recordings and it is possible to play one recording a hundred thousand times. It also has the advantage of a very long period of recording and "playback," since the wire is long.

Other methods of recording sound on magnetized tape have proven successful. Some such machines use a magnetized steel tape in place of the wire. In others, a thin metal film on a paper surface is magnetized. During World War II, the Germans developed at least one such device which proved to be very efficient. This instrument was later developed in the United States.

The first wire recorders offered for public sale at the end of World War II cost several hundred dollars, but prices soon went down. Originally, they had been planned to sell for less than \$100. Mass production was

WIRT, WILLIAM ALBERT

expected to increase their popularity for home use. P.H.C.

WIREWORM is the name given to the hard-skinned grubs, or larvae, of click beetles. They are so named be-



U.S.D.A.

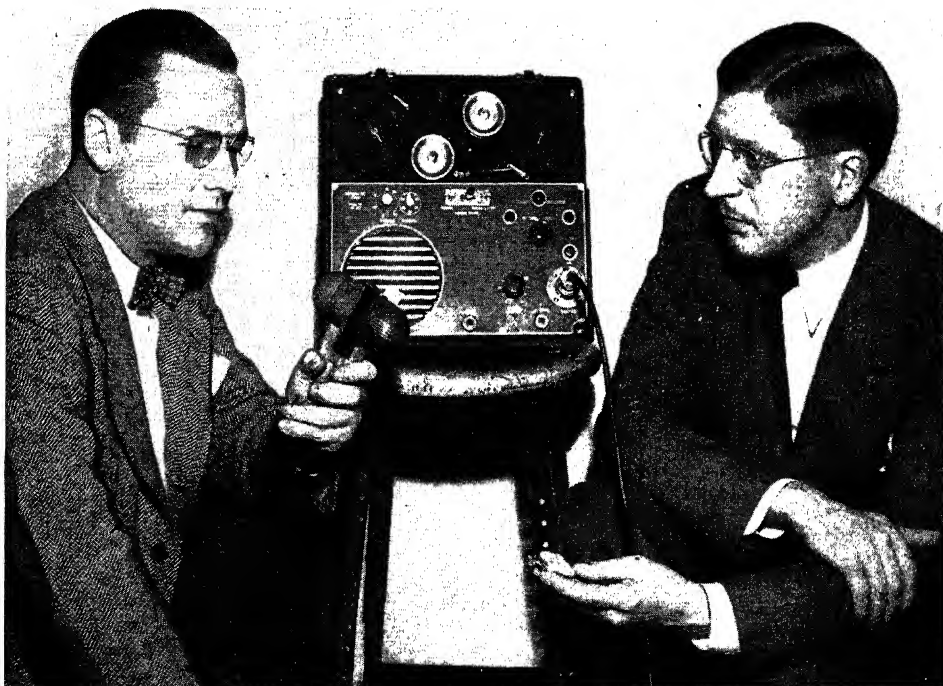
The Wireworm Causes Great Damage to Farm Crops

cause they look somewhat like a piece of wire. These grubs usually live in the earth or in decaying wood for two or three years. They often do great damage to crops by eating the roots of plants. Wireworms are yellowish or brownish in color and are from a quarter to a half inch long. They have three pairs of legs. Farmers find them an important enemy of plants. Sometimes the farmers rotate the crops to help reduce the number of wireworms. As yet there is no practical method, however, of treating the soil to destroy these insects. Farmers have treated corn seed with a coat of tar and Paris green to keep the young corn plants from being injured by wireworms.

G.P.

Classification. All wireworms belong to the family *Elateridae*, in the order *Coleoptera*.

WIRT, WILLIAM ALBERT (1874-1938). See INDIANA (Education); PLATOON SCHOOL.



The Wire Recorder is widely used to record radio programs. It has an advantage over records, because the wire may be

demagnetized and used for another program. For this reason, wire recorders are popular in business offices.



WISCONSIN THE BADGER STATE

WISCONSIN gets its name from the Algonquian Indian word *Wees-konsan*, which means the *gathering of the waters*. The name described the chief river of the region, because most of its many branches joined the main stream near its head. Later the name was applied to the territory, and finally to the state. Wisconsin has long been known as **THE BADGER STATE**, and its inhabitants as *Badgers*. This is because the miners of early days dug into the hillsides for ore, like badgers burrowing holes in the ground.

The early French explorers were the first white men to see the Wisconsin country, with its majestic forests and beautiful lakes. They followed the pathway of the Great Lakes into the heart of the continent. In their frail canoes, the explorers paddled down the St. Croix and Wisconsin rivers to the mighty Mississippi. Here they saw the prairie, covered knee-deep with grass, stretch to the western horizon.

Since pioneer days, Wisconsin has been a leader in education, government, agriculture, industry, and science. Progressive laws, new theories of education, valuable agricultural experiments, and various discoveries and inventions have come from the state. Here the first practical typewriter was designed and built, and the first self-binder for use in harvesting was marketed. It was here, too, that the modern roller flour mill was invented, which made it possible to grind the hard wheat grown in the northern states and Canada. History was made at Appleton in 1882 when the first commercial electric-lighting plant in the world was installed. In agriculture, Wisconsin has been a leader in the development of co-operatives, farmers' institutes, dairymen's associations, and cheese-marketing federations. It was also the first state to conduct scientific tests in an effort to wipe out tuberculosis among cattle.

Many nation-wide government reforms had their first tryouts in Wisconsin, under the leadership of the La Follettes and others. Wisconsin led the way to the direct primary law, regulation of public utility and railroad rates, pensions for mothers and teachers, minimum wage laws, and workmen's compensation. Wisconsin was the first to establish county normal schools for training rural teachers, and to provide agriculture and home economics classes for country children. The state has long been looked upon as a political testing ground for progressive ideas and movements.

Today, Wisconsin is one of the best-developed agri-

cultural and industrial states in the Union. It is the "Dairyland of the Nation," and ranks first in the total value of butter, cheese, and condensed milk. It has more cheese factories, dairy cows, and silos than any other state. Industrially, it ranks second in the nation in the manufacture of paper and wood pulp, agricultural instruments, aluminum, plumbers' supplies, leather, and cranes. Large mine hoists and Diesel engines come from its factories. Most of the steam shovels that were used in building the Panama Canal were made in Wisconsin plants. Enormous amounts of war materials were produced in the state during World War II.

The Land and Its Resources

Extent: Area, 56,154 square miles (including 1,439 square miles of inland water); twenty-fifth in size among the states. *Greatest length*, 320 miles; *greatest width*, 295 miles; *shore line*, 673 miles.

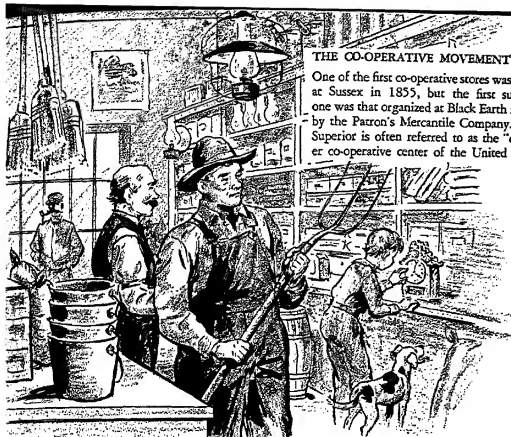
Physical Features: *Elevation*, highest, Rib Mountain, near Wausau in the north-central section, 1,940 feet above sea level; lowest, 581 feet above sea level along the western shores of Lake Michigan. *Chief rivers*, flowing into the Mississippi, Wisconsin, Black, Chippewa, St. Croix; flowing into Green Bay, Menominee, Peshtigo, Fox, Oconto. *Chief natural lakes*, Winnebago, Chippewa, Koshkomong, Mendota, Poygan, Pepin, Beaver Dam, Shawano, Geneva; *chief artificial lakes*, Wisconsin and Lake Wisconsin. *Chief islands*, Washington, Apostle Islands.

Climate: *Temperature*, average annual, 43.8° Fahrenheit; average summer, 67.6° F.; average winter, 17.5° F.; lowest on record, -54° F. at Danbury (Jan., 1922); highest on record, 114° F. at Wisconsin Dells (July, 1936). *Precipitation*, average annual, 30.57 inches; average April 1 to Sep. 30, 20.47 inches; average Oct. 1 to March 31, 10.1 inches. *Snowfall*, average annual, 46.2 inches.

Location and Surface Features. Wisconsin lies between the headwaters of the Mississippi and Saint Lawrence rivers, two of the greatest inland waterways in North America. This fact has had an important influence on the commercial development of the state.

Pronunciation Guide

Allouez AH LOO AY	Oconomowoc
Eau Claire oh KLAIR	oh KAHN oh moh WAHK
Fond du Lac	Peshigo PESH tih goh
fahn doo LAK	Prairie du Chien PRAIR-
Manitowoc	ih doo SHEEN
MAN ih toh WAHK	Saint Croix saynt KROY
Menasha mee NASH ah	Viroqua vih RO quah
Muskego mus KEE goh	Waukesha WAW kee shaw
Nicolet NIK oh let	



THE CO-OPERATIVE MOVEMENT

One of the first co-operative stores was opened at Sussex in 1855, but the first successful one was that organized at Black Earth in 1886 by the Patron's Mercantile Company. Today, Superior is often referred to as the "consumer co-operative center of the United States."



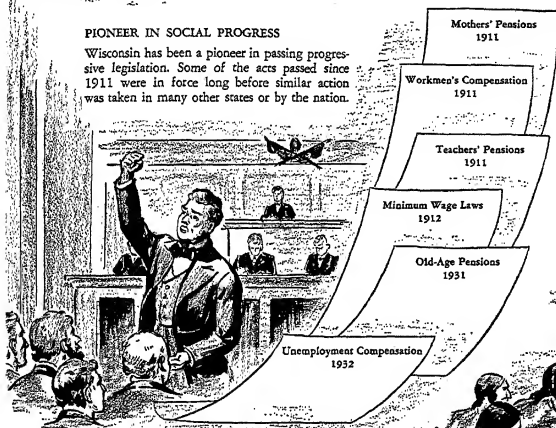
LEADING CHEESE STATE

Cheese was first made by Swiss immigrants who settled at New Glarus in 1845, and the first American cheese factory was opened by Chester Hazen at Ladoga in 1864. Today, Wisconsin is the leading cheese-making state in the Union.

MEMORABLE WISCONSIN EVENTS

PIONEER IN SOCIAL PROGRESS

Wisconsin has been a pioneer in passing progressive legislation. Some of the acts passed since 1911 were in force long before similar action was taken in many other states or by the nation.



INVENTION OF THE TYPEWRITER

In 1868, three Milwaukee inventors, Carlos Glidden, Samuel Soule, and Christopher Latham Sholes patented a machine, the first of several destined to make Sholes famous as the inventor of the first practical typewriter.



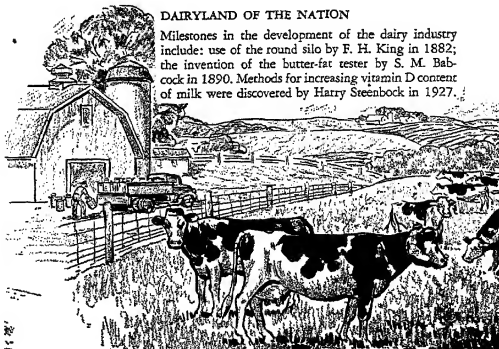
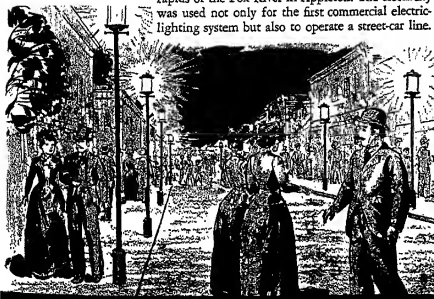
NICOLET AT GREEN BAY

In 1634, while searching for the Northwest Passage to China, Jean Nicolet, a French explorer, landed on the shores of Green Bay. Because he believed that he would meet the Chinese in this "land beyond the Great Water," he put on a richly embroidered mandarin robe.



FIRST HYDROELECTRIC PLANT

In 1882, the first plant in the United States using water power in generating electricity was built at the rapids of the Fox River in Appleton. The electricity was used not only for the first commercial electric-lighting system but also to operate a street-car line.

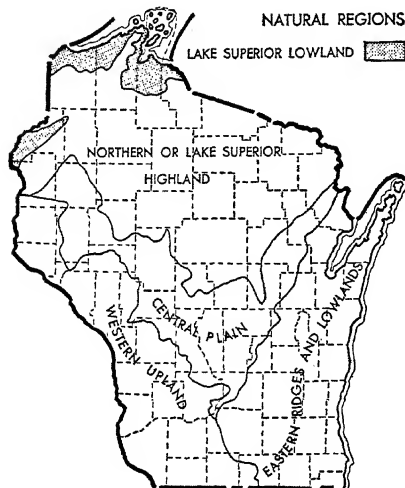


DAIRYLAND OF THE NATION

Milestones in the development of the dairy industry include: use of the round silo by F. H. King in 1882; the invention of the butter-fat tester by S. M. Babcock in 1890. Methods for increasing vitamin D content of milk were discovered by Harry Greenback in 1927.

The Mississippi and its branch, the St. Croix, form all but forty miles of the western boundary of Wisconsin, and Lake Superior and Lake Michigan border the state on the north and east. For the boundaries of Wisconsin, see the colored map.

Twenty-five million years ago Wisconsin was a region of great mountains 10,000 feet high, as lofty as the Coast Range of California. Glaciers tore down the mountains, and filled the valleys with glacial deposits. Today, Wisconsin is a land of ridges, low rolling hills,



fertile valleys and plains, and beautiful lakes. The state may be divided into five chief natural regions: the Western Upland, the Eastern Ridges and Lowlands, the Northern or Lake Superior Highland, the Central Plain, and the Lake Superior Lowland.

The *Western Upland* stretches along the western boundary from St. Croix County to Rock County on the Illinois boundary. It is one of the most picturesque regions in the state. There are beautiful hills and rolling plains, with scenic limestone bluffs fringing the Mississippi River. Rich pastures support numerous dairy herds, which make it possible for this region to produce much butter and nearly half of the country's Swiss and Limburger cheese.

The *Eastern Ridges and Lowlands* cover the eastern part of the state from Green Bay to the southern boundary. This region was once covered by glaciers. It is a plain with limestone ridges running south from Lake Winnebago, and with bluffs and sandy beaches along the shores of Lake Michigan. The northern Fox River rapids provide the greatest water power in the state. The rapids are surrounded by forests, which has led to the establishment of the pulp and paper industry and to the rise of many cities. These cities, with other great industrial centers along Lake Michigan, have made the Eastern Ridges and Lowlands the greatest manufacturing region and most thickly populated part of Wisconsin. Sixty-one per cent of the manufactures of the state are produced in four southeastern counties. This section produces 50 per cent of the country's brick and

Muenster cheese. One county produces more milk per square mile than any other in the nation. This is also the region where most of the condensed milk is produced. Tobacco is grown in the southwest. The Door County Peninsula, in the northeastern section of the region, is the most noted apple and cherry section of the state.

The *Northern or Lake Superior Highland* is a favorite vacation land. It is a great upland area, broken by heavily forested hills and dotted with hundreds of small lakes. Cranberries are grown in marshy sections of the northwest and northern forests. The southern strip is mainly pasture land. It includes a well-known dairy belt, where several varieties of cheese are manufactured. In the north, there is iron in the Gogebic Range and along the Menominee River. The upper Wisconsin River furnishes water power and favorable locations for paper and pulp manufacture.

The *Central Plain* is an arc-shaped area which runs across the central part of the state. Because of the action of old glaciers, the region has flat-topped sandy stretches, mounds and ridges like castles, and thousands of acres of peat-filled swamplands where cranberries flourish. Hay and potatoes are also leading crops. In the Dells of the Wisconsin River, glaciers carved the hard rock into deep canyons and odd rock formations.

The *Lake Superior Lowland* is a small irregular area with bluffs and sandy beaches along the lake. There is iron in the east, but the low land is used chiefly for grazing and hay production. The Apostle Islands are just off the central beaches. They are a popular summer resort, noted for their scenic beauty.

Rivers and Lakes. Wisconsin has three drainage systems. One drains the eastern part of the state into Lake Michigan, a shorter system empties into Lake Superior, and the largest flows into the Mississippi. Only the Wisconsin River can be used for water traffic. At Portage, a short canal links the Wisconsin River with the Fox River, so there is a continuous water route from Green Bay and Lake Michigan to the Mississippi. Another waterway between Lake Superior and the Mississippi flows by the way of the Brule River to the headwaters of the St. Croix. The Chippewa, St. Croix, Menominee, Wolf, and Wisconsin rivers have many rapids and falls which provide water power for state industries. The most valuable falls are in the northern Fox River.

Thousands of large and small lakes, of which four thousand have been mapped, have scenic and recreational values. Lake Mendota, on whose shores Madison is located, is noted for its beauty. Lake Geneva, whose blue waters are often compared to those of the Lake of Galilee, is also famous. Green Lake is the deepest of all the inland Wisconsin lakes.

Climate. The climate varies greatly between the northern and southern ends of the state, and there are sudden and extreme changes of temperature. The winters are generally cold. The summers are warm, except near Lake Superior. Such extremes as 114° F. to -54° F. have been known. But the temperature is less changeable than that of the inland states to the west, because the Great Lakes are a moderating influence on the temperature. The average summer temperature varies from

Abbotsford, (F6) . . .	920	Bloomington, (E10) . . .	677	Conover, (H3) . . .	75	Fall River, (H9) . . .	425	Hillsdale, (C5) . . .	175
Ableman, (G9) . . .	395	Blue Mounds, (G9) . . .	196	Conrad, (E5) . . .	128	Folan, (A4) . . .	103	Hingham, (K8) . . .	901
	243	Blue River, (E9) . . .	381	Conroy Valley, (E8) . . .	469	Fence, (A4) . . .	117	Hixton, (E7) . . .	30
	1,310	Boaz, (E9) . . .	230	Cooperstown, (L7) . . .	129	Fennimore, (E10) . . .	1,592	Holcombe, (D5) . . .	339
	313	Boschel, (K6) . . .	661	Cornell, (D5) . . .	1,759	Ferriswood, (C6) . . .	156	Hollandale, (G10) . . .	290
Albany, (I) . . .	130	Boscobel, (E9) . . .	2,008	Cornucopia, (D2) . . .	225	Ferryville, (D9) . . .	376	Holmen, (D8) . . .	400
	741	Bowler, (J6) . . .	313	Cottage Grove, (H9) . . .	310	Field, (F4) . . .	199	Honey Creek, (L9) . . .	62
	170	Boycerville, (C5) . . .	535	Couderay, (D4) . . .	189	Fillmore, (K9) . . .	200	Horton, (K10) . . .	202
Algon, (M6) . . .	2,652	Boyd, (E6) . . .	618	Crandon, (J4) . . .	2,000	Fish Creek, (M5) . . .	200	Hortonville, (J7) . . .	2,253
Allen Grove, (J10) . . .	225	Brand, (L7) . . .	207	Cream, (C7) . . .	165	Fisk, (J8) . . .	100	Houlton, (A5) . . .	225
	327	Brandon, (J8) . . .	708	Crivitz, (L5) . . .	514	Florence, (C4) . . .	1,295	Hudson, (A6) . . .	2,987
	130	Brantwood, (F4) . . .	103	Cuba City, (G9) . . .	374	Fond du Lac, (K) . . .	75	Humbird, (E6) . . .	387
	43	Brgs . . .	708	Cudahy, (F10) . . .	1,259	Forest Junction, (K7) . . .	351	Hurley, (F3) . . .	3,373
	325	Brill, (I) . . .	150	Cumberland, (H4) . . .	10,561	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
	449	Brittton, (I) . . .	375	Curtiss, (F6) . . .	153	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
	96	Bristol, (I) . . .	0	Cushing, (A4) . . .	153	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Custer, (H6) . . .	100	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Amberg, (K4) . . .		Brokaw, (C5) . . .	477	Cylon, (B5) . . .	93	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Amery, (B5) . . .		Brookfield, (K1) . . .	275	Dale, (J7) . . .	693	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Amherst, (H7) . . .				Dallas, (C5) . . .	436	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Amherst Junction, (H) . . .				Dalton, (H8) . . .	265	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Angela, (K6) . . .	75			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Anwa, (H6) . . .	283			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Antigo, (H5) . . .				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Appleton, (J7) . . .				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Arbor Vitae, (C4) . . .	133			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
	1,830			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Arena, (C9) . . .	278			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Argonne, (J4) . . .	463			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Argyle, (G10) . . .	735			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Arkansas, (C6) . . .	296			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Arlake, (G7) . . .	116			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Arlington, (H9) . . .	250			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Armstrong Creek, (K4) . . .	371			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Arpin, (C6) . . .	250			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
	90			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Ashpuff, (H7) . . .				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Ashland, (E2) . . .	11,10			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Achens, (C5) . . .	856			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Auburndale, (F6) . . .	342			Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
Avoca, (F9) . . .				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327	Forestville, (H10) . . .	459	Hustler, (J9) . . .	50
				Dawson, (B3) . . .	327				

WISCONSIN

Total Population 3,137,587

Lomira, (J8).....	659	Mount Horeb, (G10) 1,610	Plainville, (C8).....	143	Sechewiaton, (E7).....	69	Underhill, (K6).....	73
London, (H9).....	582	Mount Sterling, (D9).....	Platteville, (E10).....	4,762	Seneca, (E9).....	605	Union Grove, (F8).....	190
Lone Rock, (F9).....	502	Mt. Vernon, (G10).....	Pleasant Prairie, (L10).....	85	Sextonville, (F9).....	171	Unity, (F6).....	973
Long Lake, (J4).....	95	Mukwonago, (K10).....	Plover, (G7).....	300	Sharon, (J11).....	812	Utica, (H10).....	286
Longwood, (E6).....	61	Muscoda, (F9).....	Plum City, (B6).....	368	Shawano, (J6).....	5,565	Valders, (L7).....	580
Louisburg, (E10).....	117	Muskogee, (K10).....	Plymouth, (L8).....	4,170	Sheboygan, (L8).....	40,638	Valmy, (M6).....	71
Lowell, (J9).....	282	Nashotah, (J1).....	Polar, (H5).....	87	Sheboygan Falls, (L8).....	3,395	Valton, (F8).....	73
Loyal, (F6).....	921	Nashville, (J5).....	Polonia, (H6).....	185	Sheldon, (D3).....	199	Van Buren, (G10).....	535
Lublin, (E5).....	148	Nashville, (J5).....	Poplar, (C2).....	462	Shell Lake, (C4).....	872	Vesper, (F7).....	5
Luck, (B4).....	617	Nevadale, (F8).....	Portage, (C18).....	7,016	Sherwood, (K7).....	308	Viola, (E8).....	
Luxemburg, (L6).....	468	Neshanic, (J7).....	Port Edwards, (G7).....	1,192	Shiocton, (K7).....	592		
Lyndon Station, (F8).....	354	Neillsville, (E6).....	Port Washington, (L9).....	4,046	Shopiere, (H10).....	283		
Lynn, (F6).....	233	Nekoosa, (G7).....	Port Wing, (D2).....	509	Shorewood, (L9).....	15,184		
Lynnville, (D9).....	209	Nelson, (C7).....	Potosi, (E10).....	506	Shorewood Hills, (G9).....	1,064		
Lyons, (K10).....	209	Nelsonville, (H7).....	Potter, (K7).....	279	Shullsburg, (F10).....	1,197		
McFarland, (H10).....	463	Nesho, (J9).....	Pound, (L5).....	310	Shullsburg, (F10).....	1,197		
MADISON, (H9).....	67,447	Neshoro, (J9).....	Pouyet, (H9).....	870	Silverlake, (K10).....	365		
Magnolia, (H10).....	63	Neshoro, (J9).....	Poyette, (H9).....	231	Siron, (B4).....	309		
Maiden Rock, (B6).....	291	New Alford, (J4).....	Pri Pippi, (J7).....	431	Sister, (M5).....	775		
Manawa, (J7).....	791	New Amsterdam, (D8).....	Prairie du Chien, (C9).....	2,622	Slinger, (K9).....	775		
Manchester, (J8).....	160	New Berlin, (D5).....	Prairie du Sac, (C9).....	1,001	Sobieski, (L6).....	263		
Manitowish, (L7) 24,404		New Berlin, (D5).....	Prairie Farm, (C5).....	335	Soldiers Grove, (F9).....	778		
Maple, (C2).....	117	Newburg, (K9).....	Pray, (F7).....	117	Sonoma Springs, (C3).....	392		
Mapleton, (J1).....	123	New Digging, (F10).....	Prentice, (F4).....	452	Somers, (L10).....	138		
Marathon, (G6).....	823	New Franken, (L6).....	Prescott, (A6).....	857	Somers, (L10).....	138		
Marblehead, (K8).....	200	New Glarus, (G10).....	Princeton, (H8).....	1,247	Somerset, (A5).....	476		
Marcy, (K1).....	117	New Holstein, (K8).....	Prospect, (K2).....	107	Soperton, (J5).....	250		
Marango, (E3).....	103	New Lisbon, (F8).....	Pulaski, (K6).....	979	South Milwaukee, (K10).....	11,334		
Marinette, (L5).....	14,183	New London, (J7).....	Pulifer, (K6).....	117	South Wayne, (G10).....	331		
Marion, (J6).....	1,034	New Richmond, (A5).....	Racine, (L10).....	67,195	Sparta, (E8).....	5,820		
Markesan, (J8).....	912	Niagara, (K4).....	Radiation, (F8).....	1,146	Spencer, (F6).....	506		
Markon, (J3).....	130	Nichols, (K6).....	Random Lake, (K8).....	613	Spencer, (F6).....	506		
Marquette, (H9).....	447	North Bend, (D7).....	Readfield, (J7).....	221	Spencer, (F6).....	506		
Marshall, (H9).....	447	North Bristol, (H9).....	Readstown, (E9).....	584	Spencer, (F6).....	506		
Marshfield, (F6).....	10,359	North Fond du Lac, (J8).....			Spencer, (F6).....	506		
Martell, (B6).....	121	North Freedom, (G9).....			Spencer, (F6).....	506		
Martintown, (G10).....	87	North Hudson, (A5).....			Spencer, (F6).....	506		
Mason, (D3).....	152	North Lake, (J1).....			Spencer, (F6).....	506		
Mather, (F7).....	132	Northland, (H6).....			Spencer, (F6).....	506		
Mattoon, (J6).....	524	North Prairie, (K10).....			Spencer, (F6).....	506		
Mauston, (F8).....	2,621	Northwalk, (E8).....			Spencer, (F6).....	506		
Mayville, (K9).....	2,734	Oakfield, (J8).....			Spencer, (F6).....	506		
Mayville, (K9).....	2,734	Oakwood, (L2).....			Spencer, (F6).....	506		
Medford, (F5).....	2,361	Oconomowoc, (K9).....			Spencer, (F6).....	506		
Mellen, (E3).....	1,598	Oconto, (L6).....			Spencer, (F6).....	506		
Melrose, (E7).....	462	Oconto Falls, (K6).....			Spencer, (F6).....	506		
Melvin, (E8).....	135	Odanah, (E2).....			Spencer, (F6).....	506		
Menasha, (J7).....	10,481	Ogongowic, (J7).....			Spencer, (F6).....	506		
Menomonee Falls, (K9).....	1,469	Ojibwa, (F6).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Okauchee, (J1).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Oke, (G9).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Oliver, (B2).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Omro, (J7).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Onalaska, (D8).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Onida, (K7).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Ontario, (E8).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Oosburg, (L8).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Oregon, (H10).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Orfordville, (H10).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Oscoda, (A5).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Oskosh, (J8).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Osseo, (D6).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Owen, (F6).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Oxford, (H8).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Packwaukee, (H8).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Palmyra, (J10).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Paroli, (G10).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Park Falls, (F4).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Patch Grove, (D10).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Patzau, (B3).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pelican Lake, (H4).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pella, (J6).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pembine, (L4).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pence, (F3).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pensaukee, (L6).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Peppin, (F7).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Perkins, (E5).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Peshigo, (L5).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pewaukee, (K9).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Phelps, (H3).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Phillips, (E4).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Phlox, (J5).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pickett, (J8).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pigeon Falls, (D7).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pilsen, (L7).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Pittsville, (F7).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Plain, (F9).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582	Plainfield, (G7).....			Spencer, (F6).....	506		
Menomonie, (C6).....	6,582				Spencer, (F6).....	506		

● County seat.

about 70° F. in the south to 62° F. in the northern part. The average winter temperature ranges from 22° F. in the south to 12° F. in the extreme north. The average rainfall is about thirty inches a year. The pure, cool air and the health-giving pine forests have made Wisconsin one of the most famous summer-resort regions of inland America.

Natural Resources. The leading natural resources are a variety of rich soils, great forests, pleasing climate, and wildlife. Huge pine forests covered most of the north and north-central portions of the state at the time the white man came to Wisconsin. Maple and oak are the most common trees in the south, but spruce, hemlock, cedar, birch, and elm are found in great numbers. Huckleberries, blueberries, Juneberries, wild black currants, and other shrubs grow abundantly on the cut-over lands. Wisconsin also has forty-five species of native orchids. Only the northern Virginia deer remains of the great herds of elk, moose, and deer that once roamed the forests and prairies.

There are more than two hundred species of fish. The northern waters are especially well stocked with game fish. These include trout, bass, whitefish, pickerel, sturgeon, pike, and the muskellunge. In the Mississippi, buffalo fish, carp, eel, catfish, perch, and bass are caught. Great flocks of birds visit the state for a short time in spring and fall, since Wisconsin lies in the direct path of the north-south flyways.

Conservation and Development. Closed seasons for some game, birds, and fish were established as early as 1851. A fish inspector was appointed in 1866, and in 1867 a commission was set up to study forest resources. In 1915 most conservation activities were put under a single head. The Wisconsin Wild Life Federation was established in 1935.

There are ten forest-protection districts, especially for fire prevention and fire fighting. State nurseries distribute 25,000,000 to 30,000,000 trees a year to the conservation commission, 4-H clubs, school groups, and farmers for replanting forests. Almost 3,000 miles of three-row shelter belt has been planted to check soil erosion in six sandy central counties. The idea of the shelter belt originated in Wisconsin and was adopted in the dust-bowl area of the Middle West during the drought years of the 1930's.

Over a billion fish from the thirty-four state hatcheries are distributed each year to stock creeks, rivers, and lakes. The Federal Upper Mississippi River Wildlife and Fish Refuge lies partly in Wisconsin. It furnishes resting and breeding grounds for migratory waterfowl. There is also a state game and fur farm at Poyette.

The People and Their Work

Population: 3,137,587 (1940), ranking thirteenth among the states. *Density,* 57.3 persons per square mile, ranking nineteenth. *Distribution,* urban, 53.5 per cent; rural, 46.5 per cent. *Largest cities,* Milwaukee (587,472), Madison (67,447), Racine (67,195), Kenosha (48,765), Green Bay (46,235), La Crosse (42,707). For population of other cities, see back of colored map. *Chief ports:* Milwaukee, Manitowoc, Superior, Ashland, Green Bay, and La Crosse.

Chief Products: *Manufactured,* motor vehicles and parts; wood products, including paper, pulp, and furniture;

malt liquors; tractors; footwear; internal-combustion engines; construction machinery; electrical apparatus; meat-packing products; sanitary ware; condensed and evaporated milk, cheese, and butter; canned vegetables and fruits; beet sugar; stoves; knit goods; leather and leather goods; polishes and waxes; ships. *Agricultural,* dairy products, hay and forage, hogs and pork, cattle and calves, eggs, oats and other small grains, corn, vegetables (especially potatoes and canning peas), fruits (especially cherries and apples), cranberries, hemp, soybeans, barley, rye, sugar beets, tobacco, ginseng, flax, maple sugar and sirup, horses, sheep and wool. *Mineral,* stone, iron ore, sand and gravel, clays.

The People. During the French period of Wisconsin history and the days of the fur traders, the chief Indian tribes were the Potawatomi, Chippewa (Ojibway), Ottawa, Menominee, Fox, and Kickapoo, all of the Algonquian family, and the Winnebago and Dakota Indians of the Sioux family. After the Black Hawk War of 1832, the Indian tribes were sent to reservations in various western states. There now are about 12,000 Indians in the state, chiefly in the Lac du Flambeau and the Lac Court Oreilles reservations.

The lead mines in the southwestern area brought many miners to Wisconsin during the 1820's. But settlement of the region did not really begin until after the Black Hawk War, which ended in 1838. Soldiers returned to their homes with glowing reports of fertile valleys, great forests, and rich mines. Among those who came to the region were miners from the tin mines of Cornwall, and the southerners who came up the Mississippi with their slaves. When the lead deposits were mined out, many of the miners turned to farming. Newcomers from Scotland, Wales, Ireland, and Switzerland were also chiefly farmers. The Swiss began to arrive in 1845. They established New Glarus, and soon began to make the Swiss cheese for which Green County is still famous.

Between 1850 and 1860, great numbers of political refugees, including Carl Schurz, the famous statesman, arrived from Germany. These refugees and others who came in the 1880's settled along the shores of Lake Michigan, especially at Milwaukee. This city became a leading center for German-American culture in the United States. During the 1880's also, the Scandinavians and Finns came to cut down the forests and to work in the iron mines. The Danes turned to dairying, like the Swiss. Later, thousands of workers came from Poland, Russia, and other European countries during the rapid development of the state.

Today, more than 90 per cent of the inhabitants are American-born, but a large percentage have foreign parents. Among the foreign-born, the largest groups are made up of immigrants from Germany, Poland, Norway, Russia, Austria, Sweden, Czechoslovakia, Canada, and Italy.

Manufacturing. Wisconsin has gone through several distinct periods in its industrial history. In the first period, wheat was the chief crop, and milling was the chief industry. Next came the period when lumbering was most important. Then dairy products took the lead. Today, Wisconsin is a leading producer of iron and steel products, which yield over a third of its income from all manufactures. Wisconsin smelts no iron, but its location on the Great Lakes makes it possible for the

state to import iron, steel, and coal cheaply from Indiana, Ohio, and Illinois. For this reason, many metal-manufacturing industries are located along or near Lake Michigan, especially at Kenosha, Racine, West Allis, Milwaukee and its suburbs, and farther north at Manitowoc, Two Rivers, Sheboygan, Kohler, and Green Bay. Manitowoc and Two Rivers together make one of the great aluminum-manufacturing centers of the United States. An automatic automobile factory is located at Milwaukee.

The milling of lumber rapidly lost importance after 1910, for by that time most of the best forests in Wisconsin had been cut. But lumber milling is still important in such cities as Merrill, Tomahawk, Rhinelander, and Marinette. A wide variety of wood products, especially wood pulp and paper, are made in such cities as Wisconsin Rapids, Eau Claire, Appleton, Neenah, Menasha, and Green Bay. Most of the woodworking industries are located along the streams, especially the lower Fox and upper Wisconsin rivers.

Cheese and butter making started rather early and became the leading industry of the state after the invention of the Babcock butterfat tester in 1890 at the University of Wisconsin. Today, Wisconsin cheese factories, which are located in the small towns and cities, and even at many crossroads, produce more than half of all the cheese made in the United States. Other dairy products include butter; condensed, evaporated, powdered, and dried milk; and ice cream. Malted milk was invented by William Horlick in 1882, and since then it has been a leading product. More than 85 per cent of the national output comes from Wisconsin.

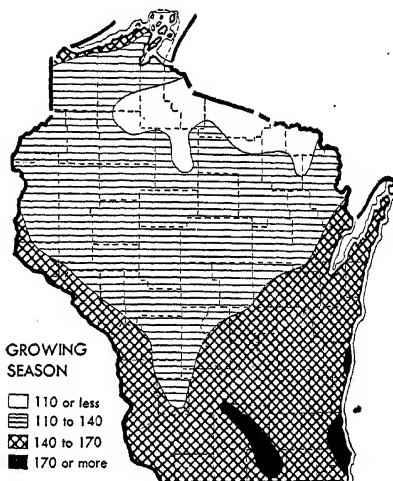
Other industries based on agriculture include meat packing, which is especially important at Cudahy, near Milwaukee; and the manufacture of leather, shoes, and malt liquors; the canning and freezing of fruits and vegetables; and the processing of sugar beets. Among other manufactured goods are rubber products (especially tires, textiles and knit goods), confectionery, household and industrial waxes and polishes, flashlights, batteries, radio equipment, fountain pens, and hosiery. During World War II, submarines were built at Manitowoc.

Agriculture. Between 1850 and 1880, Wisconsin was almost a one-crop state. It depended chiefly on wheat for farm income, although corn, oats, and hay were raised. Gradually, chinch bugs and worn-out soil made the wheat farmers give up trying to compete with the more productive wheat fields of Minnesota and the Dakotas. Instead, they turned to farming of many different crops, and specialized in dairying and the raising of fruits and vegetables.

Dairying and Livestock Raising. Dairying is by far the most important branch of agriculture in Wisconsin. It started about 1870, mainly as a result of the efforts of William Dempster Hoard. The industry became so important that Wisconsin has led the states in the value of its dairy products since World War I. Wisconsin has about seven milk cows to every ten persons in the state. Milk accounts for nearly half of the total farm income of the state. The state is also noted for the purebred dairy cattle which it sells by the thousands each year to farmers in other states and various foreign countries.

Wisconsin also raises large numbers of beef cattle, horses, hogs (chiefly in the southern corn-producing areas), sheep, poultry, and bees. Fur farming, which is an outgrowth of the early fur-trapping industry, still flourishes. The largest silver-fox farm in the world is in Wisconsin, and it furnishes about 40 per cent of all the silver-fox pelts produced in the United States.

Field Crops. Today, hay and forage are grown in all sections of the state. They are the most valuable field crops, and are raised chiefly for livestock feed within the



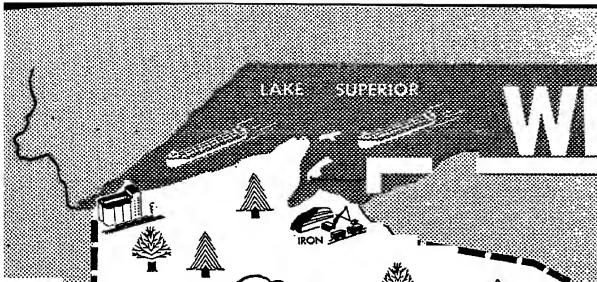
state. Large quantities of clover seed are produced, in addition to timothy, clover, and alfalfa. Oats, the most important grain crop, is grown chiefly for cattle feed. Corn, which ranks second to oats, is husked and fed to hogs, and is also used as silage in those areas where the short growing season keeps it from ripening fully. Barley is raised, and sold largely to the breweries. Other important crops include rye and soybeans. Soybeans are grown for use in industry. Tobacco is a valuable crop in the south, especially around Viroqua and southeast of Madison.

Wisconsin leads all the states in the production of ginseng, an herb used in medicine, and moss for sale to the florist trade. The state also raises about 80 per cent of all the hemp grown in the United States. In addition, it produces valuable amounts of sugar beets, flax, hops, popcorn, and maple sugar and sirup.

Vegetables and Fruits. Wisconsin has long been a leading producer of potatoes and snap beans, and is first among the states in the production of peas for drying and canning. Wisconsin farmers also raise large quantities of cabbage, beets, green corn, cucumbers, and onions.

Apples and cherries are the most plentiful of the orchard fruits, and are grown chiefly in Door County. Large crops of plums and grapes are gathered. Small fruits which grow especially well include strawberries, raspberries, loganberries, and cranberries. Only Massachusetts raises more cranberries than Wisconsin.

Co-operatives. The American farmers' co-operative



LEADING PRODUCTS AND INDUSTRIES

SOME PRODUCTS ARE OF STATE-WIDE IMPORTANCE
THE SYMBOLS ON THE MAP INDICATE LEADING AREAS ONLY



LAND USE

CROPS	PASTURE	FORESTS
29%	14%	49%

VALUE OF LEADING PRODUCTS

EACH DISK REPRESENTS 10 MILLION DOLLARS
DISKS REPRESENTING FACTORY PRODUCTS INDICATE
VALUE ADDED TO MATERIALS IN THE FACTORY



FARM
DAIRY PRODUCTS
HAY
HOGS AND PORK
CATTLE, CALVES
EGGS
OATS

MINE

IRON ORE
SAND AND GRAVEL



FACTORY (PLANTS AND MILLS)
MOTOR VEHICLES AND PARTS
PAPER AND PULP
MALT LIQUORS
TRACTORS
FOOTWEAR
INTERNAL COMBUSTION ENGINES
NEWSPAPERS AND PERIODICALS
CONSTRUCTION MACHINERY
ELECTRICAL APPARATUS
MEAT PACKING
SANITARY WARE
CONDENSED AND EVAPORATED MILK

movement began in Wisconsin, and developed on a large scale after 1915. Today, about one tenth of all the co-operative groups of the United States are in this one state. Marketing organizations are active in selling such produce as milk, butter, cheese, cranberries, tobacco, and furs. A large number of consumers' purchasing co-operatives also make it possible for members to buy at a saving.

Lumbering. Logging of the great Wisconsin forests began in the 1830's near the mouths of the branches of the Mississippi. Here sawmills were set up for cutting lumber to be shipped by raft to New Orleans. By 1870 lumbering had developed on a large scale, and it was a leading industry between 1890 and 1910.

Minerals. Although Wisconsin has few minerals, mining was its first important industry. The Indians were mining before the French explorers came, and the pioneers were working mines as early as 1816. By 1822 much mining was carried on, and before 1840 Wisconsin was producing nearly half of all the lead mined in the United States. During the War between the States, zinc was also mined from the same area. But after about twenty-five years, the metal deposits gave out and mining became unimportant.

Stone, including sandstone, limestone, and granite, is now the most important mineral resource of the state. It is quarried for use in building, road making, and the manufacture of fertilizer and Portland cement. The rapid development of concrete roads has increased the demand for sand and gravel. Examples of Wisconsin's fine granite building stone of various colors may be seen in the Capitol at Madison. The iron ore deposits of the state are found in the northwest, in Iron, Florence, Dodge, Sauk, and Columbia counties. They are similar to those of Michigan and Minnesota, though much smaller. Large amounts of mineral waters are also sold. The springs at Waukesha have made that city a famous health resort. Other Wisconsin mineral products include brick and tile clay, shale, talc, and soapstone.

Transportation. Many of the early settlers came up the Mississippi in canoes or *bateaux*, and later by steamboats. Towns were built on all the best natural harbors on the Great Lakes. These were usually at the mouths of the rivers. Much of the Mississippi River traffic disappeared after the railways came, but lake transportation is still very important.

Milwaukee is one of the leading ports on Lake Michigan. The city's harbor handles large quantities of manufactured goods and agricultural products. Many other smaller cities on Lake Michigan have busy ports from which great amounts of timber and farm products are sent to the East. Superior, which has one of the best natural harbors on the Great Lakes, and Ashland, also on Lake Superior, are other leading ports. These cities ship large quantities of iron ore and other products. Milwaukee and Superior handle much of the coal for Wisconsin, Minnesota, the Dakotas, and Montana. A ferry service which began in 1892, runs between Kewaunee and Frankfort, Mich. A canal at Sturgeon Bay connects Green Bay and Lake Michigan.

After World War I, the state modernized and enlarged its highways. It now has about 40,000 miles of improved and hard-surfaced roads. A. R. Hirst, a Wis-

consin highway engineer, thought up the method of marking highways with numbers, and Wisconsin had the first marked trunk highway system maintained by state aid in the United States.

The first railroad in Wisconsin connected Milwaukee with Waukesha, only sixteen miles away, in 1851. Three years later the line was extended to Madison. In 1857 the railroad reached Prairie du Chien on the Mississippi. The building of other railroad lines led to the founding of many towns in the interior of the state, and many river settlements soon lost their importance. Today, a network of more than 7,000 miles of railways crisscrosses the state.

Air lines carrying mail, passengers, and freight serve several of the larger cities, including Milwaukee, Madison, and Superior. Planes carry hundreds of vacationists to Wisconsin each year. In all, there are about fifty airports in the state, and a number of seaplane bases.

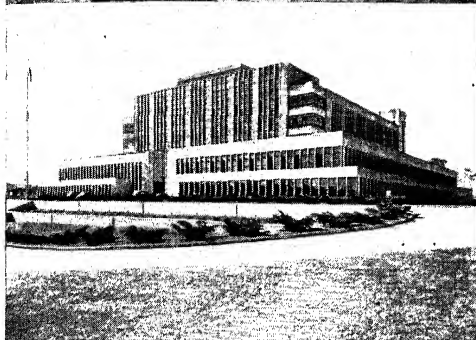
Press and Radio. The first newspaper in Wisconsin was the weekly *Intelligencer*, which was published at Green Bay in 1833. Today, about 385 newspapers, including about fifty dailies, and over a hundred other periodicals are published in the state. The *Milwaukee Journal*, which has been published since 1882, is the most widely circulated of the newspapers. The more than 300 weekly newspapers are united through the Wisconsin Press Association, which was founded in 1853. It was the first organization of its kind in the United States.

Wireless experiments were being held in the physics laboratories of the University of Wisconsin as early as 1909. Commercial broadcasting in the state began over WIBA at Madison in 1925. Today, there are stations in several of the larger cities. Among the best known are those at Madison and Milwaukee.

Social and Cultural Achievements

Educational Institutions: *State Teachers' Colleges*, at Platteville, established 1866; at Whitewater, 1868; at Oshkosh, 1871; at River Falls, 1874; at Milwaukee, 1880; at Stevens Point, 1894; at Superior, 1896; at La Crosse, 1909; at Eau Claire, 1916. *Stout Institute* (for home economics and industrial education) at Menominee, 1903. *Other Colleges and Universities*, Beloit, Carroll, Lawrence, Milton, Milwaukee-Downer, Mount Mary, Northland, Northwestern, Ripon, St. Francis, and St. Norbert colleges; Marquette University; University of Wisconsin. *Professional and Theological Schools*, Alverno College of Music, Mission House College and Theological Seminary, Evangelical Lutheran Theological Seminary, Nashotah House (theological seminary), Redemptionist Fathers' Seminary, Seminary of St. Francis de Sales, and Viterbo College (Catholic, for women) at La Crosse.

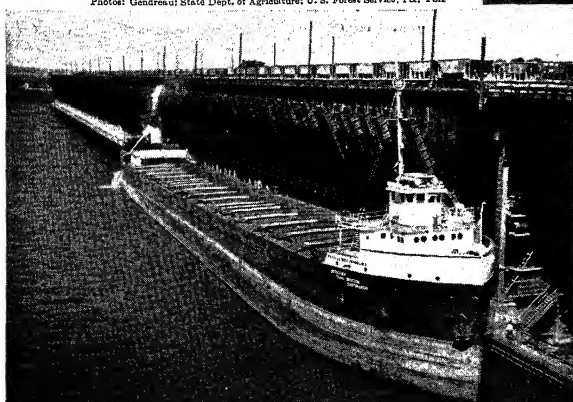
State Welfare, Correctional, and Penal Institutions: *Children*, State Public School, Sparta (dependent and neglected children). *Physically Handicapped*, School for the Deaf, Delavan; School for the Blind, Janesville; Workshop for the Blind, Milwaukee (male adults); Wisconsin State Sanitarium, Statesan; and Lake Tomahawk State Camp (for the tubercular). *Mentally Handicapped*, hospitals at Waupun (for the most serious cases), Mendota, and Winnebago; Northern College and Training School, Chippewa Falls; Southern College and Training School, Union Grove; camps for male transients, at Camp Hayward and Phelps. *Prisons* (men) State Prison, Waupun; (boys) State Reformatory, Green Bay; Industrial School for Boys, Waukesha; Industrial Home for Women, Taycheedah; Industrial School for Girls, Oregon.



AT WORK IN THE BADGER STATE

First left: A winter logging scene near Goodman. *First right:* Stoney Ridge cheese factory, near Manawa, is typical of the many small factories throughout the state. *Second left:* The United States Forest Products Laboratory at Madison is noted for its research and experiments on wood and wood products. *Right:* Testing limburger cheese in a factory near Monroe, center of the industry. *Below:* Loading ore at Superior, which has the largest ore dock in the world. *Third right:* Packing butter near Portage.

Photos: Gendreau; State Dept. of Agriculture; U. S. Forest Service; Pix; FSA



Education. The first free public school was organized in 1845 at Kenosha (then Southport) through the efforts of Michael Frank, a newspaper editor. The state constitution adopted in 1848 made generous provisions for free public schools. School districts were organized by law in 1849. Compulsory education laws were passed in 1879, 1903, and 1907. Today, regular attendance is required of all children under sixteen years of age. All employed children under eighteen who have not completed high school must attend a part-time school. Special classes are held for physically and mentally handicapped children.

Wisconsin schools have won nationwide attention for their excellent work in rural, agricultural, and vocational education. County schools of agriculture and domestic science in rural areas were organized in 1901. Through special grants of money, the state encourages school districts to maintain high standards. Normal schools for training teachers in rural areas were established in 1899. In 1911 a bill was passed requiring all cities and towns of more than 5,000 population to establish vocational schools, and the first board of vocational education was set up. The Milwaukee Vocational School is the largest institution of its kind in the world. The Wisconsin Institute of Technology at Platteville trains men for mining work and as highway engineers.

Accredited colleges and universities of Wisconsin are discussed under their own names in *THE WORLD BOOK ENCYCLOPEDIA*. For a list of these colleges and universities, see the *Related Subjects* at the end of this article.

Libraries. Wisconsin has 325 public library systems. The first general library law was passed in 1840. In 1848 the constitution provided that part of the school fund should be used for libraries. In 1868, towns were given the power to buy books for free libraries, and in 1895 a state law provided support for public libraries. The first library in the state is said to have been founded at the Prairieville Academy (now Carroll College) in 1840 at Waukesha.

The State Historical Society and the University of Wisconsin libraries are in a single building in Madison. A Legislative Reference Library was established in Madison in 1901. It was the first of its kind in the country. The free library commission gives valuable assistance in educational work through its traveling libraries.

Arts and Crafts. Wisconsin has been outstanding in the field of literature, with many famous books on Indian, pioneer, lumbering, and frontier life. Much of the Indian literature is preserved in the works of Henry Schoolcraft, from which Longfellow got most of the material he used in "Hiawatha." *Jesuit Relations*, which is seventy volumes prepared between 1611 and 1768, is the source of much information about the Middle West before it was settled by Americans. Other Wisconsin writers include Hamlin Garland, author of *Middle Border Trilogy*, Zona Gale, who wrote *Miss Lulu Bett*, which won the Pulitzer prize in 1921, and Edna Ferber, author of *A Peculiar Treasure*. Ella Wheeler Wilcox, William Ellery Leonard, and Adelaide Crapsey are among the best-known poets.

Among famous songs written in Wisconsin were "End of a Perfect Day," by Carrie Jacobs Bond; "Little Brown Church in the Vale," by William S. Pitts; "Sweet Bye and Bye," by Sanford Fillmore Bennett and Joseph P. Webster; and "Silver Threads Among the Gold," by Eben E. Rexford.

Wisconsin claims two famous sculptors, Vinnie Ream, born in Madison, who made a statue of Abraham Lincoln, and Helen Farnsworth Mears. Among the painters, Carl Van Marr is famous. He was a native of Milwaukee, and painted "The Flagellants" which hangs in the Milwaukee Auditorium. The state's most distinguished architect is Frank Lloyd Wright, who founded his summer school of architecture, Taliesin, at Spring Green.

The Wisconsin Historical Museum at Madison contains a fine collection of folk art, and Milwaukee has the Layton Art Gallery and the Milwaukee Art Institute.

Religion. For many years after Father René Ménard arrived in 1660, Jesuit missionaries worked among the Indians and fur trappers. In 1665 Allouez opened a mission on Chequamegon Bay, and in 1669 he built four more missions in the Fox River Valley.

The earliest English Protestant ministers came to the region in the 1820's. After German, Scandinavian, and Swiss immigrants arrived from Europe, many Lutheran churches were established, including the Norwegian Lutheran Church which was founded at Muskego in 1843. A Mormon church was established at Burlington in 1844.

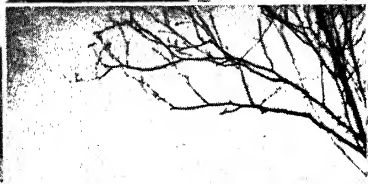
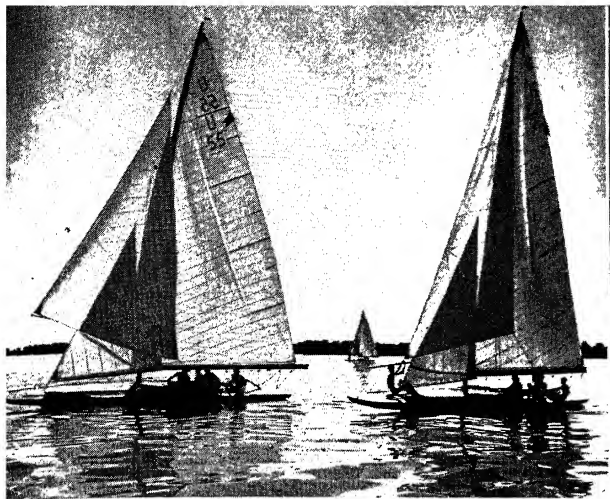
Today, there are about forty religious groups in the state. The largest number of these is the Roman Catholic Church. Ranking next in order of size are the Lutheran, Methodist, Congregationalist, and Presbyterian churches.

Social Welfare. In 1876 a state board of health was organized to enforce health laws. In 1911 the social welfare laws that were passed by the Wisconsin legislature attracted national attention. These included pensions for mothers and teachers, regulation of working conditions for women and children in industry, workmen's compensation, and employers' liability. In 1925 the Basic Science Law was passed. This law requires that all who desire to heal the sick must pass examinations in anatomy, pathology, and diagnosis. Provision is made for aid six months before and six months after childbirth to a mother who is unable to provide proper care for herself and her child. State laws also provide for physical examinations before marriage and advanced planning of public works to give employment in hard times.

Recreation and Outdoors

Wisconsin is one of the great playground centers of the Middle West. It has opportunities for a wide variety of summer and winter sports and recreation.

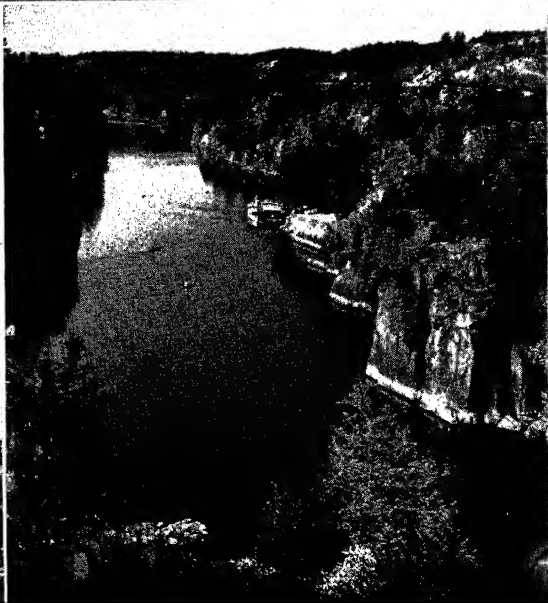
National and State Forests. Large areas of Wisconsin woodlands are part of two national forests, Chequamegon (1,031,022 acres) and Nicolet (985,400 acres). Both of these were created in 1936. The eight state forests are American Legion (28,527 acres), Brule River (5,060 acres), Council Grounds (278 acres), Flambeau River (2,128 acres), Kettle Moraine (3,000 acres),



VACATION LAND

Wisconsin is one of the most popular vacation states in the Middle West. On its many lovely lakes sailboat races, *first left*, are a familiar sight during the summer months. In winter, tobogganning, *first right*, attracts large numbers of winter-sports enthusiasts to various parts of the state. Each year, thousands of visitors go to the beautiful Wisconsin Dells, *right*. In the southern part of the state, tourists are attracted to the unusual barn murals, such as the one shown *above*, painted by barn artist Frank Engebretson of Brodhead. *Below*: The State Capitol at Madison.

Photos: Milwaukee Journal; U. S. Forest Service; Pic: Gordon Coster; Sawdust



Northern Highland (119,000 acres), Point Beach (714 acres), and Silver Cliff (800 acres).

State Parks. Among the scenic or historic state parks in Wisconsin are:

Copper Falls (1,200 acres), near Mellen. Picturesque cascades and waterfalls, where the Bad River flows through rocky canyons to Lake Superior. Created, 1929.

Devil's Lake (1,313 acres), near Baraboo. This park is located around Devil's Lake in Baraboo Hills. It contains many unusual rock formations and historic Indian mounds. Created, 1911.

First Capitol (2 acres), near Belmont. Marks the site of the first Capitol of the Territory of Wisconsin, established in 1836. Created, 1924.

Interstate (581 acres), near St. Croix Falls. This park is so named because part of it is located in Minnesota, along the Dalles of the St. Croix River. It has high jagged cliffs and interesting rock formations, and is the oldest park in the state. Created, 1900.

Merrick (123 acres), near Fountain City. Named for George Merrick, a famous Mississippi River boat pilot. It is surrounded by the water of Fountain City Bay. Created, 1932.

Nelson Dewey Farmstead (720 acres), near Cassville. Established at the place where Nelson Dewey, the first governor of Wisconsin, once had a plantation. The buildings and furnishings of the period are restored.

Pottison (1,140 acres), near Superior. The Black River flows northward through this park, forming Big Manitou Falls (the largest in the state), Little Manitou Falls, and many smaller waterfalls. Created, 1920.

Peninsula (3,388 acres), near Ephraim. Located on the western shore of the peninsula between Green Bay and Lake Michigan, in the heart of the state's famous Cherryland. Created, 1910.

Perrot (937 acres), near Trempealeau. Named for the Frenchman, Nicholas Perrot, who built winter quarters in this area in 1685. Trempealeau Mountain, which rises out of the black waters of the Mississippi River, is the only remains of an old French fort in the state. Created, 1918.

Potawatomi (1,046 acres), near Sturgeon Bay. Located where Green and Sturgeon bays meet. It includes a limestone headland, known as "Government Bluff" because the land was first claimed by the United States Government. Created, 1928.

Rib Mountain (324 acres), near Wausau. The highest point of land in Wisconsin. Rib Mountain is also an ancient landmark of mid-Wisconsin and the scene of one of the Paul Bunyan folk tales. Created, 1927.

Terry Andrae (167 acres), near Sheboygan. It is made up of sand dunes, a large white sand beach, and a wilderness area with a bird sanctuary established especially for waterfowl. Created, 1928.

Tower Hill (108 acres), near Spring Green. Site of the smelter where lead from the mines of southwestern Wisconsin was melted and dropped down an old shot tower to form gun shot. Created, 1922.

Wyalusing (1,671 acres), near Prairie du Chien. Located where the Wisconsin joins the Mississippi River. The park marks the height from which Marquette and Joliet first viewed the scenic grandeur of southwestern Wisconsin. Created, 1917.

Other Interesting Places to Visit in Wisconsin include:

Cave of the Mounds, near Blue Mounds, an underground cavern formed by the action of waters beneath the earth. Discovered in 1939.

Dells Region, located in the heart of the old Winnebago Indian territory along the Wisconsin River.

Ephraim, on Eagle Harbor near Eagle Bluff, where a Moravian settlement was founded in 1853.

Hamlin Garland's Home, West Salem. This kite-shaped, two-story wooden building is described in *A Son of the Middle Border*.

Indian Reservations in the northern part of the state include the Menominee, La Pointe, Lac Court Oreilles, and Lac du Flambeau.

Great Northern Elevator, at Superior, is the largest grain elevator in the world. It sorts and grades about 45,000,000 bushels of grain each year.

Kohler Village, four miles west of Sheboygan, a landscaped village of 450 workers' cottages, famous for its beautiful architecture.

Memorial Union, Madison, the chief social center at the University of Wisconsin, designed by Arthur Peabody in the style of the palaces of Venice, Italy.

New Glarus, located on the banks of Little Sugar River, is an old Swiss settlement modeled after Glarus, Switzerland. Includes a Swiss lace factory and several cheese factories.

Porter-Tank Cottage, Green Bay, oldest house in the state, built in 1776 by Francois Roi, a French fur trader.

Villa Louis, in Prairie du Chien, a mansion built by Hercules L. Dousman in 1843, and containing many relics of the early 1800's.

Government

National: Electoral votes, 12. Representatives in Congress, 10.

State: Senators, 33; representatives, 100. *Capital*, Madison since 1837.

Counties: 71.

Wisconsin was admitted as a state in 1848 and is still governed by its original constitution, which is the oldest state constitution west of the Alleghenies. The Wisconsin constitution forbids a state debt of over \$100,000, contains few legislative decrees, and is difficult to amend. Amendments must start in the legislature, pass both houses by a majority of the elected members in two legislatures in succession, and then be approved by a vote of the people. Still, forty-two amendments have been added to meet changing conditions. The Wisconsin plan of government provides for four departments, legislative, executive, administrative, and judicial.

The Legislative Reference Library supplies members of the legislature with information on every subject, and gives technical assistance in drawing up laws. Much of the specialized legislation is turned over to highly paid, expert commissions. The university co-operates closely with the state, helping to keep education and government working together and to put the most advanced research into practical use. In general, this co-operation is what is sometimes called the *Wisconsin Idea*. This name was used especially to refer to the progressive laws passed before, in, and shortly after 1911. Robert Marion La Follette was responsible for many of the progressive laws that were passed between 1900 and 1925. Among these were the direct primary law (1903), regulation of public-utility rates (1905), setting up of a commission for settling industrial disputes and enforcing labor laws (1911), and granting of full civil and property rights to women (1921).

Executive officers are the governor and the lieutenant governor. The secretary of state, treasurer, and attorney general are administrative officers. All officers are elected for two-year terms. A state superintendent of public instruction is elected for a four-year term.

Legislative power is vested in two houses, a senate and an assembly. Members of the assembly and one half of the state senators are elected every two years in the even-numbered years. Regular sessions of the legis-

lature meet in January of odd-numbered years.

Judicial decisions are made by circuit, superior, county, municipal, and special courts, with the supreme court as the highest court. Seven supreme court justices are elected for ten-year terms at nonpartisan elections. Only one justice can be elected in any one year. Justices of the two superior courts and the twenty circuit courts, and county judges are elected for six years. Municipal and special-court justices are elected for four or six-year terms, depending upon the law which set up each particular court.

Administrative Department was created by the legislative department and controlled by the executive and judicial departments. It administers the boards, bureaus, and commissions which were formerly controlled by the executive and judicial departments.

Local Government. Counties are governed by boards made up of two chairmen and one supervisor from each village and each ward of a city. Cities and villages have power to decide on their own local affairs and form of government.

National Politics have played an important part in state history, especially in 1924 when Robert M. La Follette ran for President as a Progressive. Between 1872 and 1944, Wisconsin has supported the Republican party in thirteen elections, the Democratic party in five, and the Progressive party in one. See **POLITICAL PARTY** (chart).

Famous Men and Women

Many well-known men and women, native to Wisconsin or doing their most distinguished work there, have separate biographies (see Biographies in the list of *Related Subjects* at the end of this article). Others who have won state, national, or international fame include:

Allis, Edward Phelps (1824-1889), manufacturer. Born at Cazenovia, N.Y. Between 1846 and 1860, he established large tanneries at Two Rivers and Milwaukee. In 1860 Allis bought a small foundry in Milwaukee which he developed into one of the largest industrial plants in the Middle West.

Appleby, John Francis (1840-1917), inventor. Born at Westmoreland, N.Y. He invented and developed the Appleby Knotter, a self-binder which was widely used in the grain regions of the world.

Dodge, Henry (1782-1867), born at Old Vincennes, Ind. Pioneer soldier, statesman, and first governor of the Wisconsin Territory from 1836 to 1840. Served in Congress from 1840 to 1844, and as governor from 1845 to 1848, until the territory became a state. He was also one of the first two Senators to be elected from Wisconsin to the national Congress, and served until 1857.

Glidden, Carlos (1834-1877), born in Scioto County, Ohio. An inventor who worked in Milwaukee with C. L. Sholes and S. W. Soule in designing the typewriter.

Hoard, William Dempster (1836-1918), editor, and Governor of Wisconsin from 1889 to 1891. Born at Munnsville, N.Y., he went to Wisconsin in 1857. In 1885 he founded *Hoard's Dairyman* at Fort Atkinson, a periodical which became known throughout the world. He organized the Jefferson County Dairyman's Association in 1871, and the Wisconsin State Dairyman's Association in 1872, with Chester Hazen.

King, Franklin Hiram (1848-1911), born near White-water. An agricultural scientist who invented the round silo, which was first used in Wisconsin in 1882. He served as Chief of the Division of Soil Management of the United States Bureau of Soil from 1901 to 1904.

Lapham, Increase Allen (1811-1873), scientist. Born at Palmyra, N.Y. He was a strong influence in getting the United States Government to set up the first Weather Bureau in 1869. He explored the Wisconsin Indian Mounds, and helped to establish the Milwaukee-Downer College.

McCarthy, Charles (1873-1921), born at Brockton, Mass. Professor of political science at the University of Wisconsin. In 1901 he organized the first legislative reference library, and served as director until his death. He also published *The Wisconsin Idea* with Robert La Follette, Sr., in 1912. McCarthy was responsible for such educational reforms as the correspondence-school methods for university courses for rural areas, part-time youth education, continuation schools, and special apprentice schools for industrial workers.

Mazzuchelli, Samuel Charles (1806-1864), a Roman Catholic missionary. Born in Milan, Italy, he came to America in 1828. He built many churches in Wisconsin, including the Church of St. John the Baptist at Green Bay, and the Church of St. Gabriel at Prairie du Chien. He founded Sinsinawa Mound College in 1845, and served as chaplain of the first territorial legislature.

Mears, Helen Farnsworth (1876-1916), sculptor. Born at Oshkosh. Created "The Genius of Wisconsin" for the World's Columbian Exposition in Chicago (1893). This work was later placed in the state rotunda at Madison. She also created the Frances E. Willard statue at the Capitol in Washington, D.C., and the "Fountain of Life" for the St. Louis Exposition (1904).

Schurz, Margaretha Meyer (1832-1876), born in Germany, and came to America in 1852. In 1856 she opened one of the first kindergartens in the United States at Watertown. Wife of Carl Schurz, famous statesman.

Sholes, Christopher Latham (1819-1890), printer, journalist, and inventor. Born at Moorsburg, Pa. He worked with Carlos Glidden and Samuel Soule in designing various models of a typewriting machine. He is given credit for having created the first workable typewriter, which he sold to the Remington Arms Company for \$12,000 in 1873.

State Symbols and Events

State Seal. A sailor holding a coil of rope, and a laborer resting on a pick, support a large shield, divided into four sections. On the shield are a plow, a crossed shovel and pick, an anchor, and an arm holding a hammer. In the center are the arms and motto of the United States, and on the base are a horn of plenty and a pyramid of pig lead. Below them, thirteen stars represent the original states. A badger, symbol of the State, and the state motto are displayed above the shield.

State Flag. The state seal (see above) is in the center of a dark blue field. The edges are trimmed with a knotted fringe of yellow silk. See **FLAG** (color plate, Flags of the States).

State Motto. Forward.

State Bird. Robin. See **BIRD** (color plate, Birds Seen in the City).

State Flower. Violet. See **FLOWER** (color plate, Woodland Flowers).

State Tree. None.

State Song. None.

Annual State Events. Among the interesting events on the state calendar are:

Amateur United States and Canada Ski Meet; Amateur National Skating Competition, U.S. and Canada, Oconomowoc, in January (no fixed date).

Little International Livestock and Horse Show, Madison, first Friday in February.



Winter Carnival, Eagle River, in February (no fixed date).

Smelt Carnival, Marinette, March 20 through April 5.

Wisconsin Dairy Day, state-wide, last week in March.

Cherry Blossom Week, Sturgeon Bay, May (no fixed date).

Wisconsin Day, state-wide anniversary of statehood, May 29.

State Fair, Milwaukee, last week in August.

Cranberry Festival, Wisconsin Rapids, in September (no fixed date).

Leif Ericson Day, state-wide, October 9.

Wisconsin Cheese Week, state-wide, November or December (no fixed date).

History

1634 Jean Nicolet landed on Green Bay shore.

1673 Joliet and Marquette traveled through Wisconsin.

1684 First French post built at Green Bay.

1763 Wisconsin given up to the English by the French.

1781 Permanent settlement established at Prairie du Chien.

1783 Wisconsin given to the United States.

1814 Fort Shelby built at Prairie du Chien.

1836 Territory of Wisconsin organized by act of Congress.

1848 Wisconsin admitted as a state.

1872 Wisconsin Dairymen's Association organized.

1901 Robert M. La Follette, first native-born governor, took office.

1911 Laws passed for incorporation of co-operatives.

1914 Wisconsin Cheese Federation organized.

1917 New state Capitol completed.

1942 Shipbuilding yards and industrial plants turned to manufacture of war materials.

1945 Wisconsin industry turned to peacetime demands.

Early Exploration and Settlement. In 1634 Jean Nicolet, a French explorer, arrived at Green Bay from Canada. He claimed the valley of the Fox River for France. In 1658, Radisson and Groseilliers came to open up the fur trade and explore the Lake Superior region. Joliet, Marquette, La Salle, and various French missionaries followed the routes blazed by these early explorers. The French influence can be seen in such place names as Eau Claire, Fond du Lac, Prairie du Chien, and La Crosse.

Struggle for Control. From 1712 to 1740, a long and bloody war was fought between the French and the Fox Indians. Both wanted control of the Fox and Wisconsin rivers, the chief route through the country. This war had two results which were important to the later history of the state. First, routes by way of Lake Superior and portage routes from Lakes Erie and Ontario to the Ohio River were opened up. Second, the long war weakened the French control of the Mississippi and Saint Lawrence valleys, brought on the French and Indian War, and caused France to lose territory to the English in 1763. The English established permanent settlements which the French had begun at Green Bay, Prairie du Chien, Milwaukee, and Portage. After the Revolution, Wisconsin was a part of the Northwest Territory of the United States, but it really remained under British control until after the War of 1812.

The romantic, adventurous, and often lawless fur trade was the basis of the economic life of the Wisconsin country until after the Black Hawk War began in 1832. In fact, the wealth of New France rose and fell with the price of beaver pelts. Under English control, the fur trade was controlled by the great Hudson's Bay Com-

pany. When the Americans came, the trade passed to the American Fur Company, controlled by John Jacob Astor.

Territorial Days. Wisconsin was in turn a part of the territories of Indiana from 1800 to 1809, Illinois from 1809 to 1818, and Michigan from 1818 to 1836. In 1836 it was organized as a separate territory, with the capital at Belmont in Lafayette County. The territory included parts of present-day Minnesota, Iowa, and the Dakotas. In 1838 that part of the territory west of the Mississippi was included in the Territory of Iowa.

Progress as a State. Wisconsin was admitted to the Union on May 29, 1848, after the people had prepared and accepted a constitution. The passage of the Kansas-Nebraska Bill, which extended slavery to northern regions, aroused a protest meeting in Ripon, Wis. A new political organization was born from this meeting. Its name, the Republican party, was suggested by Horace Greeley. The name was formally adopted at Jackson, Michigan, in July. In 1856 there was such a bitter dispute over an election that the state almost had a civil war. Governor William A. Barston, Democratic governor from 1854 to 1856, was a candidate for reelection against the Republican candidate, Coles Bashford. The Republican candidate had charged the Barston administration with dishonesty. The election machinery was in charge of the Democrats, who announced that their candidates were all elected. The Republicans accused the Democrats of further dishonesty and the state was turned into political disorder. The contest was decided by the supreme court, which ruled that Bashford had been elected, and he became the first Republican governor of Wisconsin.

More than 91,000 Wisconsin men fought in the War between the States. The Iron Brigade was made up largely of Wisconsin regiments and was commanded by Wisconsin generals. The state provided funds to soldiers when the value of money went down because of the war. State money was also voted to protect soldiers from mortgage foreclosures, and to add to the small pay of noncommissioned officers who had families.

After the financial panic of 1873, which was caused chiefly by too fast an enlargement of the railroads and general credit inflation, the state passed the Potter, or Granger, Law. By this law, the state insisted upon the right to regulate railroad freight and passenger rates within Wisconsin. Soon this law began to act as a boomerang, because no new roads were built and old railroads were neglected. As a result, the law was modified in 1876. Less than thirty years later, in 1905, a new rate-regulating commission was created with wide powers over railroads and public utilities.

In the late 1890's a dispute in the Republican party led to the formation of what later became known as the Progressive party, under the leadership of Robert M. La Follette. Strict insurance laws drove dishonest companies out of the state, civil-service reforms required all officeholders and applicants to pass competitive examinations, and new laws governing examination of state banks greatly reduced the number of bank failures.

During World War I, Wisconsin furnished 2.5 per cent of the soldiers, and was the first state to complete the draft and report to Washington. A soldiers' bonus

law, which provided ten dollars for each month in service, was passed in 1919.

Steady progress in agriculture, industry, and business continued until the depression struck the country in the 1930's. Since Wisconsin had no state debt, it stood the shock much better than it otherwise could have done. During World War II, the state speeded up production of foodstuffs, ships, and war materials for shipment to the forces of the United Nations. C.J.A., revised by E.G.D.

Related Subjects. The reader is also referred to:

BIOGRAPHS

Andrews, Roy Chapman	Mitscher, Marc Andrew
Berger, Victor L.	Muir, John
Bond, Carrie Jacobs	Munroe, Kirk
Briggs, Clare A.	O'Keeffe, Georgia
Catt, Carrie Chapman	Ringling Brothers
Ferber, Edna	Schurz, Carl
Frank, Glenn	Veblen, Thorstein Bunde
Gale, Zona	Wescott, Glenway
Garland, Hamlin	Wheeler, William Morton
La Follette	Wilcox, Ella Wheeler
Leonard, William Ellery	Wilder, Laura Ingalls
Lunt, Alfred	Wilder, Thornton Niven
Mason, Max	Wright, Frank Lloyd

CHIEF PRODUCTS

Alfalfa	Dairying	Iron and Steel
Aluminum	Egg	Leather
Barley	Flax	Lumber
Buckwheat	Ginseng	Milk
Butter	Granite	Oats
Cattle	Hay	Pea
Cheese	Hemp	Potato
Cherry	Hog	Sandstone
Corn	Honey	Shoe
Cranberry		

CITIES

Green Bay	Madison	Racine
Kenosha	Milwaukee	Sheboygan
La Crosse	Oshkosh	Superior

COLLEGES AND UNIVERSITIES

Beloit College	Ripon College
Carroll College	St. Norbert College
Lawrence College	Stout Institute
Marquette University	Wisconsin, University of
Milwaukee-Downer College	Wisconsin State Teachers
Mount Mary College	College

HISTORY

Indian, American	Nicolet, Jean
(Eastern Woodsman)	Northwest Territory
Joliet, Louis	Pioneer Life
Marquette, Jacques	Republican Party

PHYSICAL FEATURES

Dalles	Rock River
Great Lakes	Wisconsin River
Mississippi River	

UNCLASSIFIED

Co-operative	United States of America
Food (Famous Foods	(color plate, Rivers, Water-
of the States)	falls, and Lakes [Dells of
	the Wisconsin River])

Books for Younger Readers

BRINK, CAROL RYRIE. *Caddie Woodlawn*. Macmillan, 1935. Wisconsin frontier life was full of fun and excitement for Caddie and her brothers. *Magical Melons*. 1944. More adventures of Caddie Woodlawn.

ENRIGHT, ELIZABETH. *Thimble Summer*. Farrar, 1938. Garnet finds a silver thimble, and all summer her life on the farm is full of happy experiences.

FERRIS, ELMER ELLSWORTH. *Jerry at the Academy*. Doubleday, 1940. Based on the author's school days at Wayland Academy, Beaver Dam, Wis. *Jerry of Seven Mile Creek*. 1938. A picture of small-town life in the Wisconsin of the 1880's.

HOLBERG, RUTH LANGLAND. *Hester and Timothy, Pioneers*. Doubleday, 1937. Story of the early settlement of Milwaukee.

HUZARSKI, RICHARD. *Brushland Bill*. Crowell, 1943. North Wisconsin woods story of trapping and animal lore.

MUGGAH, MARY GATES, and RAIHLE, P. H. *Forty-seven Wisconsin Stories*. Chippewa Falls Book Agency, 1944. True stories of various interests.

SEYMOUR, ALTA HALVERSON. *Galewood Crossing*. Presbyterian Board, 1945. Typical pioneer story of the Gale family and their new home in Wisconsin.

TUTT, CLARA LITTLE. *Badger Tales*. Lyons, 1940. Stories of geography, history, travel, incidents, events and personalities.

Books for Older Readers

DERLETH, AUGUST WILLIAM. *The Wisconsin, River of a Thousand Islands*. Farrar, 1942. *Village Year; a Sac Prairie Journal*. Coward-McCann, 1941. A chronicle of village life. *Atmosphere of Houses*. Prairie, 1939. Woodcuts of Wisconsin homes. *Bright Journey*. Scribner, 1940. Novel of early fur-trading days in the state.

GRAY, JAMES. *Pine, Stream and Prairie*. Knopf, 1945. Anecdotes and history from pioneer days to present times.

HOLMES, FREDERICK LIONEL. *Old World Wisconsin*. Hale, 1944. Contributions of European nationalities to Wisconsin. *Badger Saints and Sinners*. 1939. Biographies of persons connected with history and politics of the state.

LESUEUR, MERIDEL. *North Star Country*. Duell, 1945. (American Folkway series.) Paul Bunyan, history, and government of the state.

MARTIN, GEORGE VICTOR. *For Our Vines Have Tender Grapes*. Funk, 1940. Neighborly story about Norwegian farmers and farm life in Wisconsin.

RANEY, WILLIAM FRANCIS. *Wisconsin; a Story of Progress*. Prentice-Hall, 1940. Readable up-to-date summary of the growth of Wisconsin from 1634 to the present.

Wisconsin; a Guide to the Badger State. (American Guide series.) Duell, 1941. Natural setting, industry, and history of the state.

An Outline suitable for Wisconsin will be found with the article "State."

Questions

Upon what natural resources do two of the most important manufacturing industries of the state depend?

What great inventions were developed in Wisconsin?

What laws were passed between 1900 and 1925 to prove Wisconsin's leadership in social and political progress?

With what Wisconsin men are the following associated: typewriter, round silo, butterfat tester, the first United States Weather Bureau?

Why is Wisconsin called the "Dairyland of the Nation"?

How did the state happen to begin the manufacture of cheese?

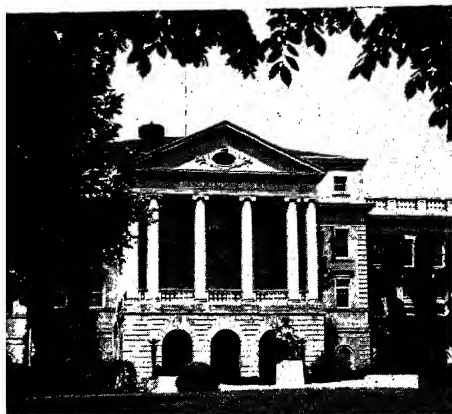
What important part have co-operatives played in the life of the state?

Where in Wisconsin are the following: The Dells, New Glarus, Ripon, Appleton? For what is each noted?

What is meant by the "Wisconsin Idea"? What men were closely connected with its development?

WISCONSIN, UNIVERSITY OF, is a state-controlled, coeducational school on the shores of Lake Mendota in Madison, Wis. It has a junior college division at the University Extension Center in Milwaukee, Wis.

The university has colleges of letters and science, agriculture, and engineering. There are also schools of law, medicine, education, journalism, library science,



University of Wisconsin

Bascom Hall, on the University of Wisconsin Campus, is the historic main entrance to the Madison, Wis., school. In front of the building is a statue of Abraham Lincoln.

music, nursing, and commerce, an extension division, and a large graduate school. Many scientific institutions associated with the university are located on the campus. Among these are the Washburn Observatory and the museum of the State Historical Society.

Students live in dormitories and co-operative houses, fraternity and sorority houses, and private homes. Loans and scholarships are available to deserving students and about 60 per cent of the students earn part of their expenses. Instruction began in 1849. Normal enrollment is about 10,000.

A.W.W.

WISCONSIN DELLS. See **DALLES**; **WISCONSIN** (illustration, Vacation Land); **WISCONSIN RIVER**.

WISCONSIN RIVER. This clear, beautiful stream rises in a lake on the Michigan-Wisconsin boundary, flows south to Portage, and then turns westward. The Wisconsin empties into the Mississippi River near Prairie du Chien. The total length of the Wisconsin is about 430 miles. Boats can sail to Portage, where a canal connects the Wisconsin with the Fox River. Portage, Merrill, Wausau, Wisconsin Rapids, and Stevens Point are the most important cities on the river's banks.

Near the town of Wisconsin Dells, the Wisconsin River forms one of the most beautiful spots in North America. Here the stream has cut its way through the soft sandstone rock to a depth of about 150 feet. Small streams, which lead in from both sides of the river, have formed many canyons of great beauty.

L.D., Jr.

See also **DALLES**; **UNITED STATES OF AMERICA** (color plate, Rivers, Waterfalls, and Lakes).

WISCONSIN STATE TEACHERS COLLEGE is the name of several state-controlled, coeducational teachers colleges in Wisconsin.

At Eau Claire, the college offers courses in general education, agriculture, business, dentistry, engineering, journalism, law, medicine, music, and nursing. The school was founded in 1916. Its enrollment is about 800.

At La Crosse, the college offers courses leading to degrees of B.S. and B.Ed. This is the only teachers college in the state offering a major in physical education. The college was founded in 1909. Its normal enrollment is about 800.

At Milwaukee, the college has divisions of education, music, and art. Courses lead to a B.S. degree. The college was founded in 1880, and has a normal enrollment of about 1,350.

At Oshkosh, the college offers courses leading to the degree of B.Ed. This school was founded in 1871, and has a normal enrollment of about 950.

At Platteville, the college offers special preparatory courses in agriculture, law, medicine, and nursing. The school was founded in 1866, and has a normal enrollment of about 600.

At River Falls, the college offers courses in education, agriculture, and the liberal arts. The school was founded in 1874. Normal enrollment is about 750.

At Stevens Point, the college offers courses in conservation education, the sciences, social science, and other subjects. This school was founded in 1894. Normal enrollment is about 850.

At Superior, the college offers special courses for the training of teachers of music and of the primary grades. Degrees of B.Ed. and B.S. are granted. The college was founded in 1896, and has a normal enrollment of about 800.

At Whitewater, the college offers special courses in business education. It was founded in 1868 and has a normal enrollment of about 900.

WISDOM TOOTH, so called because it appears late. See **TEETH** (How Teeth Develop).

WISE, ISAAC MAYER (1819-1900), was a prominent American Jewish rabbi. He was born in Steingrub, Bohemia, and came to the United States in 1846. He is generally considered the pioneer of the reform Jewish movement in the United States.

Wise founded the Hebrew Union College in Cincinnati for the education of men training to be rabbis, and was president of the college from the time of its organization in 1875 until his death. He also helped to organize the Union of American Hebrew Congregations in 1873.

I.J.R.

WISE, JAMES WATERMAN (1901-), is an American writer and lecturer. He became well known for his work in promoting better relations between Jews and Christians. One of his greatest contributions to this cause was his help in spreading the knowledge of the "Springfield Plan" of teaching children to appreciate their neighbors of different faiths and races. This plan was first used in the schools of Springfield, Mass.

Wise was born in Portland, Ore., and was educated at Columbia University. He founded the magazine *Opinion*.

I.J.R.

His Works include *The Future of Israel; Nazism — An Assault on Civilization*.

WISE, STEPHEN SAMUEL (1874-), is one of the best known of American Jewish leaders. He became noted for his liberalism and his wide activities in political and social life. He was born in Budapest, Hungary, and was brought to the United States with his family in 1875. He was educated at the College of the City of New York and Columbia University, and became a

rabbi. In 1907 Wise founded the Free Synagogue in New York City, which he served as rabbi. In 1922 he founded the Jewish Institute of Religion.

Wise was one of the organizers of the American Jewish Congress and was named its president in 1924. He became an enthusiastic champion of Zionism.

L.L.M.

See also ZIONISM.

WISHART, WISH ert, GEORGE (1513?-1546). See KNOX, JOHN.

WISTAR, WIS ter, CASPAR (1696-1752). See GLASS (Glassmaking in America).

WISTARIA, wis TAY' ri h ah, is the name of a group of rampant vines that bear great clusters of flowers and belong to the pea family. The kind of wistaria that is most often seen growing around homes in the United States is a native of China. It is one of the showiest climbing plants. It has graceful clusters of bluish-lavender blossoms. These resemble pea blossoms, and droop from a heavy screen of foliage. The flower clusters of the wistaria are one to two feet long. One kind of wistaria is said to have branches that reach out 300 feet from each side of the central woody stalk. Another wistaria is said to have covered nearly a thousand square feet of



Halsman, Black Star

Stephen S. Wise, Jewish religious leader

wall space. Wistaria is an easy plant to grow. It must be given a deep soil, plenty of moisture, and an opportunity to climb to great heights.

A.C.Ho.

Classification. The wistaria genus was named after Caspar Wistar, an American physician, and belongs to the family Leguminosae. It is also spelled WISTERIA. The species described above is *Wistaria sinensis*.

WISTER, OWEN (1860-1938), was an American novelist who was noted for his stories of Western life. Perhaps his best-known novel is *The Virginian*, which was the forerunner of the modern action-crammed cowboy novel.

Wister, the son of a prominent doctor, was born in Philadelphia. Wister studied music at Harvard University and was graduated in 1882. He spent two years in Paris studying music and then returned home. In 1885 he began to study law at Harvard and in 1889 was admitted to the bar. Wister practiced law for two years, and then gave it up to devote himself to writing. L.C.W.

His Works include *Red Men and White*; *Lin McLean*; *Lady Baltimore*; and *Philosophy 4*.

WISTITI, WIS tih tee, or OUISTITI. See MARMOSET.

WITCHCRAFT. For many years people throughout the world believed in witches with evil powers. They thought that certain persons were able to turn themselves into devils or demons. The acts that these "devils" performed were called *witchcraft*. After Christianity spread through early Europe, persons who had "sinned" against the accepted ideas of moral conduct were sometimes accused as witches.

Today most people no longer believe in witchcraft. But some simple primitive persons still cling to their



J. Horace McFarlin

Graceful Clusters of Wistaria Flowers Make This One of the Showiest of Vining Plants



The Salem Witchcraft Trials were a shameful example of intolerance and stupidity. A West Indian slave told voodoo tales to several New England children. Their parents accused the

slave of witchcraft. Cotton Mather, a colonial preacher, encouraged the trials, which resulted in the hanging of 19 "witches." More than 150 New Englanders were jailed on suspicion.

belief in evil, mysterious powers. Such persons believe that accidents may be caused by an individual who has these mystic powers. They believe that a man who practices witchcraft calls upon spirits or demons to rise up and hurt his enemies. This belief in evil spirits, or demons, is called *demonology*.

The practice of witchcraft takes many different forms. Sometimes people believe that a person who casts a curse or a spell on another person is using the "evil eye." By this they mean that the person casting the spell can do so just by looking at another person. But usually such people believe some kind of ceremony has to be used to bring about the spell. During the ceremony the witch doctor calls upon the forces of evil to come to his aid. To ward off the evil eye, an Arab holds up his hand with thumb and fingers outstretched. In some forms of witchcraft, the forces of evil are thought to be a mysterious part of nature.

Early people who believed in witchcraft and the primitive people who still believe in it think that a person may become bewitched in different ways. The process usually takes place through some physical part of the one who is being cursed. Sometimes a witch may lay a curse on his victim by using the parings of the victim's fingernails, a lock of his hair, or a piece of his clothing. In early days, people used to cut their nails and hair to keep from being bewitched. Sometimes a magic formula is used to bring punishment to the victim. The witch doctor usually mutters the victim's name while he is casting his spell. Early people who were afraid of witches sometimes used false names so that their true

names would not come to the attention of any witches.

Witchcraft, supposedly, can be directed against crops and cattle as well as against individuals. A curse may be cast upon all the things a man owns. Practicers of witchcraft claim the power to raise storms, to ruin crops, to turn men into animals, and to work miracles. In some primitive groups, the fear of bewitchment keeps everybody on his best behavior.

People practiced witchcraft in the days of the early Romans, and several thousand years before that time witchcraft was practiced in Egypt. Records have been found which show that Roman laws were passed to make the practice of witchcraft a crime. These laws forbade people to destroy crops, pull down crosses or religious objects, dig up corpses, or make images — especially those to be used in witchcraft. Sudden death or illness might arouse suspicion of witchcraft. The failure of crops might be charged to the curse of some human "devil." An innocent person of strange habits might be accused of witchcraft by enemies who held a grudge against him.

For some odd reason, women were accused of witchcraft more often than men. People thought that the witch gained her power from the devil. In return for this power, the witch was thought to have promised her soul to Satan. Witches were supposed to ride through the air and curse the pure ideas of Christianity. People believed that witches could hide themselves by turning into animals. Many persons accused witches of marrying demons and bringing monster children into the world. Peculiar tattoo marks of a toad or the foot of a

have been often found on the bodies of witches in Europe.

Early Christian churches persecuted many innocent persons who were thought to be witches. Historians believe that the Church put to death about 300,000 innocent women between the years 1484 and 1782. Victims were often tortured so brutally that they confessed to being witches in order to put an end to their torture. In Europe, Church persecutions took place in Germany, England, France, Spain, and Italy. In America the Puritans persecuted so-called witches, especially at Salem, Mass.

Many kinds of tests were used to decide whether or not a woman was a witch. One of these was the pricking test. Spots were found on the skin where pins could be stuck without causing pain. Such spots were said to be places where the devil had touched the witch. In another test, the suspected woman was thrown into a body of water. If she floated she was thought guilty of being a witch. If she drowned, at least she did so with the community believing her innocent.

The spirits played an important part in evidence against suspected witches. At a trial in England, some children were reported to have fallen into fits of vomiting crooked pins. Persons testified that the children could not utter the word "Lord," but that they could easily cry "Satan." Many persons who heard of the case believed that these children had been cursed by some witch, and that evil spirits had entered their bodies.

Many well-meaning and important persons took part in the campaign to wipe out witchcraft. Today we find it difficult to understand how so many persons could have believed in such superstitions. We may ask: how did witchcraft develop in the first place? The practice grew out of the ignorance of primitive tribes. Fear and superstition ruled instead of knowledge and reason. In the early days of man, even an eclipse of the sun was said to be the work of the devil. Magic stones and chants were used to cure illness because people knew nothing about medicine. They thought that the world was divided into a kingdom of good and a kingdom of evil. When a man suffered pain or disease, it was the work of the devil. Somehow the devil had to be driven from his body. As late as 1788, London ministers tried to drive away the evil spirits from a boy who was suffering from epilepsy. The ministers believed that the spirits had caused the boy's affliction, and that driving them from his body would lead to the lad's immediate recovery.

As the world gained more knowledge, the fear of witchcraft gradually disappeared. But witchcraft caused much suffering before civilization substituted reason for ignorance.

Salem Witchcraft. In early America, witches were persecuted in parts of Massachusetts, Connecticut, and Virginia. The terror reached its high point in the city of Salem, Mass. A colonial preacher named Cotton Mather did much to arouse the people against the evil work of witches. In 1692, as a result of Mather's efforts, nineteen were put to death as witches, and more than 150 were sent to prison for the same reason. These were the last persecutions for witchcraft in the American colonies.

The End in Europe. In England, the last trial for

witchcraft took place in 1722, but the accused woman was set free. The same year marked the last killing for witchcraft in Scotland. In 1735 Scotland repealed all laws which dealt with witchcraft. But there are still many persons in Europe, as well as among primitive tribes in other parts of the world, who believe that their lives are influenced by witches.

W.D.H.

See also *COLONIAL LIFE IN AMERICA* (illustration, Punishing Wrongdoers); *MATHER, INCREASE, AND COTTON; SUPERSTITION; WITCH OF ENDOR.*

WITCH HAZEL is a shrub or small tree that is used to make a soothing lotion. The witch hazel grows in woods of the eastern United States and Canada. It has jointed, curving branches that twist and point in all directions. The forked twigs have been used for divining rods, and the name witch hazel comes from this use by superstitious people. The sharp taste of its bark gives the plant



J. Horace McFarland

Flowers and Dry, Curling Leaves of the Witch Hazel

another name, *tobaccowood*. In some places it is also called *spotted alder* and *winterbloom*.

The witch hazel bears its flowers in October or November, after its leaves have fallen. They grow in feathery, golden clusters. The fruits do not ripen until the next year. Then the seeds are shot from their small woody capsules to a distance of several feet or yards.

Witch hazel lotion, or *hamamelis*, is a tonic and healing astringent. It is made by distilling the bark and leaves in alcohol. As a medicine it is applied on the body, and taken internally. It has been prescribed for bruises, sprains, piles, ulcers, hemorrhage, and skin troubles.

W.M.HAR.

Classification. Witch hazel belongs to the family *Hamamelidaceae*. Its botanical name is *Hamamelis virginiana*.

WITCH OF ENDOR lived in a town by that name (now called Indur) in Palestine. The Bible tells us that Saul, the first king of the Hebrews, consulted her before the battle with the Philistines in which he was killed. (I Sam. 28:7).

W.D.W.

WITENAGEMOT, *WIT* *eh nah geh* МОИТ. During early Anglo-Saxon times, the supreme council of England was known as the Witenagemot. The word *Witenagemot* means *meeting of the wise men*. The council was made up of the king or his representatives, bishops, territorial governors, and thanes, or noblemen. Before the year 827, each Saxon kingdom had its own Witenagemot. The kingdoms united after 827, and a single Witenagemot ruled the land.

The Witenagemot passed civil and religious laws, agreed to land grants, voted on war and peace, and approved the appointment of bishops and ealdormen, or assembly chiefs. Members of the council also had the power to elect a king when there was some doubt about succession to the throne. The council even had the power to dethrone a king if the ruler did not properly perform his duties. The influence of the council declined as the power of the king grew stronger. The Witenagemot disappeared after the Norman Conquest in 1066. J.S.S.

WITHERITE, *WITH* *er* *ite*. See **BARITUM**.

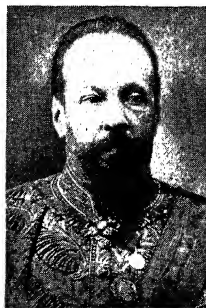
WITNESS. One who gives testimony before a court or in a judicial proceeding is called a witness. His testimony is given under oath, or if his religion forbids an oath, under affirmation. A witness may also be a person who signs a legal instrument, such as a will or deed, which is executed by another in the witness' presence.

A court witness is ordered to appear in court by a summons called a *subpoena*, which compels him to attend and to give evidence. If he fails to appear, he is liable to punishment for contempt of court. If he testifies untruthfully he is guilty of the crime of *perjury*, and can be severely punished. The trial court permits the lawyers to ask the witness whatever questions it thinks necessary for its own information and that of the jury. Often the witness must answer from his own recollection and knowledge.

The question of who is fit to serve as a witness is regulated by definite *rules of evidence*. The law regards certain persons as unfit to give legal testimony. Insane persons and persons unable to understand the nature of a binding oath are included in this class. Persons who have been convicted of infamous crimes are often called as witnesses, but the evidence they give is usually considered in connection with their past records and present motives. H.CAL.

See also **OATH**; **PERJURY**; **SUBPOENA**.

WITTE, *VIT* *eh*, **SERGEI YULIEVICH, COUNT** (1849-1915), was a Russian statesman who played a great part in the reform of Russian finances, transportation, and political institutions. He was born in Tiflis and was educated at the University of Odessa. As Minister of Finance from 1895 to 1903, he introduced the gold standard and state alcohol monopoly. He negotiated the Treaty of Portsmouth which ended Russia's war with Japan. In



Brown Bros.
Count Sergei Witte, Russian statesman-reformer

1905 he became Prime Minister. Witte drafted many constitutional reforms after the revolution of 1905, but both the czar and the liberals distrusted him and in 1906 he was dismissed. He later became a member of the Imperial Council. H.H.F.

WITTENBERG COLLEGE is a coeducational school at Springfield, Ohio. It is controlled by the Lutheran Church, but students of all faiths are admitted. The college has a full liberal arts program, as well as professional and preprofessional training in various fields. The manufacturing and commercial activities of Springfield afford students unusual opportunities for part-time employment. Wittenberg college was founded in 1845, and has an average annual enrollment of about 750 students. P.B.L.

W.K. KELLOGG FOUNDATION. See **KELLOGG, W. K., FOUNDATION**.

WOAD, *wohd*. The woad is a leafy plant that grows about three feet tall. It has many branches and bears yellow flowers. It grows in Great Britain and in the countries around the Mediterranean Sea. The woad was formerly grown because of the blue dye obtained from its leaves. The ancient Picts who lived in Great Britain before the Romans came there are believed to have stained their bodies with a dye made from woad. The leaves were made into a paste, fermented for about two weeks, and worked into balls. These dye balls were dried in the sun and allowed to ferment again. The woad is not used very much for dyeing now because it has been replaced by synthetic products. H.N.M.

Classification. The dyer's woad belongs to the mustard family *Brassicaceae* (or *Cruciferae*). Its botanical name is *Isatis tinctoria*.

WODEHOUSE, *WOHD* *hous*, "P. G." **PELHAM GRENVILLE** (1881-), is an English author of novels and short stories. His books are popular for their rich and outlandish humor and their caricatures of familiar English types. Several of his characters, especially Bertie Wooster, Jeeves, and Psmith, have become world famous.

Wodehouse was born at Guildford, and was educated at Dulwich College. Later he wrote a humor column for a London newspaper and also wrote musical comedy lyrics. He was captured by the Germans in France in 1940 and held for a time in a prison camp. I.J.

His Works include *Picadilly Jim*; *Leave It to Psmith*; *The Inimitable Jeeves*; and *Mr. Mulliner Speaking*.

WODIN, or **WODEN**. See **ODIN**.

WOFFORD COLLEGE is a liberal arts school for men at Spartanburg, S.C. It is controlled by the Methodist Church. The college gives preprofessional training in the fields of medicine, dentistry, the ministry, teaching, business, and law. The students live in dormitories.



Doubleday, Doran
P. G. Wodehouse, author of many humorous stories of English life

rollment of about 450. C.C.N.

WÖHLER, VUH ler, FRIEDRICH (1800-1882), was a German chemist. In 1829 he was the first man to make an organic substance (in this case urea) from inorganic chemicals. This experiment destroyed the belief that organic substances could be formed only in the living bodies of plants or animals. Wöhler was born at Eschersheim. In 1825 he became a chemistry instructor at the Polytechnic School in Berlin. There he isolated the elements aluminum and beryllium. In 1836 he was appointed professor of chemistry at the University of Göttingen. See also ALUMINUM. B.J.

WOLF. The wolf is a flesh-eating mammal that belongs to the dog family. Wolves live in North America, Europe, and Asia. There was a time when wolves ranged through almost every part of the United States and Canada, but this is no longer true. Timber wolves, also called gray wolves, are seldom seen nowadays. They still live in the Rocky Mountains and in heavy forests of Canada and the northern United States. Coyotes, or prairie wolves, are fairly common from the western plains to the Pacific Coast.

A wolf looks like a skinny, long-legged dog. It has a wide head, a long nose, and a pointed muzzle. Its thick tail droops, but its ears always stand up. Wolves have different colors in different climates. The northern wolves have the longer, thicker, and lighter colored coats. A full-grown wolf is nearly five and a half feet long, including the tail, which may measure nearly a foot and a half. Like most dogs, wolves have five toes on the front feet, and four on the hind ones.

The wolves of Europe are close relatives of the North American timber wolves. They are slightly smaller, and have coarse gray fur, often with a brown or yellow tinge.

Wolves live in dens, which they build in hollow logs, openings between rocks, or holes dug in the ground. Seven or eight cubs are born in each litter. They start to open their eyes a week after birth, and usually have them fully open by the ninth day. This is about the same as with dogs' puppies.

In the summer, wolves hunt alone or in pairs. They often hunt rabbits, hedgehogs, birds, snakes, rats, and field mice. Sometimes they attack a herd of sheep. In winter, they may gather in large packs. Packs of wolves have been known to kill deer, horses, cattle, and even people. There are more wolves in the Soviet Union than in any other country.

People in North America have little fear of an attack by wolves. But these animals are the enemies of stock raisers, who have declared war against them. In Alberta, Saskatchewan, and Manitoba, more than 7,000 timber wolves were killed in a single year.

Wolves can be tamed and a few have been trained to hunt like dogs. Even a very large, strong dog cannot stand against a healthy full-grown timber wolf. One hunter tells of chasing a wolf with three large wolf-hounds, each as large as a wolf. The wolf ran until he came to a bank, then turned to face his pursuers. He struck quickly with his long sharp teeth, and cut down the three dogs. Then he bounded over the ridge, and escaped the hunter's rifle. H.E.A.



N.Y. Zoological Society

The Timber Wolf Lives in Thick Mountain Forests

See also ARCTIC WOLF; COYOTE; DOG.

Classification. Wolves belong to the genus *Canis* of the family *Canidae*. Both the American and European wolves are now considered to be the same species, *C. lupus*.

WOLF, HUGO. See MUSIC (History of Music [Late Nineteenth Century Composers]).

WOLF, TASMANIAN. See TASMANIAN WOLF.

WOLF CREEK DAM is a flood-control and power project on the Cumberland River near Jamestown, Ky. The dam is 240 feet high, with a top length of 5,736 feet. The dam can control a volume of 9,800,000 cubic yards of water. It was built under the direction of the United States Army Corps of Engineers. The Wolf Creek Reservoir is 100 miles long, and covers an area of 56,830 acres. See also DAM.

WOLFE, JAMES (1727-1759), was the British general whose success in the Battle of Quebec won Canada for the British Empire. His victory against the French came after several discouraging failures which had been due in part to his poor judgment. His greatness as a general has sometimes been exaggerated because of his dramatic death at the moment of victory.

Before his attack on Quebec, Wolfe had been made a major general. On the advice of his staff he had the British fleet move his troops up the Saint Lawrence River above Quebec. During the night of September 12, 1759, his troops slipped down the river in boats. Then they landed and climbed the steep bluff on the north shore of the river to the plain above Quebec. When the French discovered them in the morning there was nothing they could do but fight the British on the battle ground which Wolfe had chosen.

Wolfe was wounded twice but continued to fight until a third bullet struck him in the lungs. The battle had taken less than fifteen minutes. The French general, Montcalm, who was defeated at Quebec, was also wounded in the battle. He lived only a few hours after Wolfe.



Brown Bros.

James Wolfe Died at the Moment of Victory at Quebec in 1759, When His British Forces Defeated the French

Wolfe was born in the County of Kent, England. He joined the army when he was fourteen years old and served in Flanders and Scotland. He was a brigadier under General Jeffrey Amherst in the Louisburg expedition, in which he led front-line troops. He returned to England after that battle, but he was appointed by William Pitt to command the expedition against Quebec.

E.R.A.

See also CANADA (History of British Conquest); LOUISBURG; MONTCALM DE SAINT VÉRAN, LOUIS JOSEPH; QUEBEC, BATTLE OF.

WOLFE, THOMAS CLAYTON (1900-1938), made as deep an impression on American literature as perhaps any modern writer. Critics differ as to the value of what he had to say, but few deny that he wrote some of the most ringing and stirring prose in American literature.

Wolfe was born in Asheville, N.C., and studied at the University of North Carolina and at Harvard University. At first he wanted to be a playwright, but he

was unsuccessful. Finally his novel *Look Homeward, Angel* was published in 1929. It created an immediate sensation. The novels *Of Time and the River* and *The Web and the Rock* which followed were equally successful. Wolfe wrote rapidly, intensely, and at great length. One of his greatest difficulties in writing was in cutting his books to suitable length.

S.M.S.

His Works include *The Story of a Novel* and *You Can't Go Home Again*, an uncompleted novel published after his death.

WOLF-FERRARI, WOHLF-fer RAH ree, ERMANN (1876-1948), was an Italian operatic composer. He is best known for his operas *The Jewels of the Madonna* and *The Secret of Susanne*. He was born in Venice, and studied music in Munich. From 1902 to 1907 he directed an opera house in Venice. Besides his operas, he also wrote a symphony and choral pieces as well as piano and violin compositions.

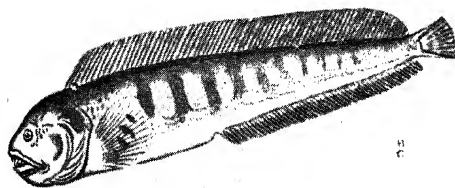
G.B.

WOLF FISH. The wolf fish received its name because of its terrifying appearance. The wolf fish is savage and will attempt to attack anyone who captures it. The bite of its strong teeth is very painful. The wolf fish lives in the North Atlantic and the North Pacific. It is reddish or grayish in color and grows about five feet long. The broad and strong front teeth of the wolf fish are useful for crushing the shells of the animals upon which it feeds. The flesh of this fish tastes much like that of the cod. In Iceland the wolf fish is often eaten. Its strong, durable



Pinchot

Thomas Wolfe, powerful American novelist



The Wolf Fish Is Savage in Both Appearance and Habits

skin is made into leather, and used in making pouches, for bookbinding, and for other purposes. L.P.Sc.

Classification. The North Atlantic wolf fish is *Anarhichas lupus* and the North Pacific wolf fish is *Anarhichthys ocellatus*.

WOLFHOUND is the name of a family of dogs made up of three breeds—the *Irish wolfhound*, the *Russian wolfhound*, and the *Scottish deerhound*. The Irish dog is the largest of all dogs, although not the heaviest. It was the companion of ancient Irish kings, and is still used for hunting. The Russian wolfhound is officially named *borzoi*. It was bred by the czars of old Russia, and resembles the greyhound except for its long, luxuriant coat. It was originally used to chase and capture wolves, which the dogs hunted in pairs. The Scottish deerhound is descended from the staghound and other large breeds once used for stalking deer. It is a very large dog, though smaller than the Irish wolfhound, and is very striking in appearance. See also BORZOI; Dog (color plate, Hounds); HOUND. S.E.M., Jr.

WOLFRAMITE is one of the two important natural sources of wolfram, commonly called tungsten. Wolframite is a mineral made up of iron, manganese, tungsten, and oxygen. It is called an iron-manganese tungstate, and its symbol is $(\text{Fe}, \text{Mn})\text{WO}_4$. The other important source of tungsten is *scheelite* (calcium tungstate, CaWO_4). The greatest deposits of wolframite are found in China, Australia, and India. If the ore has more iron than manganese, it is called *ferberite*. If it has more manganese than iron, it is called *hübnerite*. See also TUNGSTEN. A.PAB.

WOLFRAM VON ESCHENBACH, *VOHL frahm fohn ESH en bahk* (1170?-1220?). See HOLY GRAIL; MINNESINGER.

WOLLASTON, WILLIAM HYDE (1766-1828), was an English chemist and physicist. He discovered the metals palladium and rhodium, and published a number of important papers on geology. The mineral wollastonite was named for him. He was born at East Dereham, Norfolkshire, and was educated at Cambridge University. See also PALLADIUM; RHODIUM. B.J.

WOLLASTON LAKE covers 906 square miles in north-eastern Saskatchewan. The lake is seventy miles long and twenty-five miles across at its widest point. Its waters flow into both the Mackenzie and Churchill rivers. The lake is named for Dr. William Hyde Wollaston (1766-1828), a famous English chemist.

WOLSELEY, WOOLZ lih, GARNET JOSEPH, VISCOUNT (1833-1913), was a British soldier. He was born

in County Dublin, Ireland, and joined the army at the age of nineteen. He fought in the second Burmese War and later in the Crimean War. In 1857 Wolseley helped put down the Indian Mutiny, and three years later fought in the Chinese War. During these years he rose to the rank of lieutenant colonel. In 1870 he commanded the Red River Expedition against the rebel Louis Riel. In 1873 Wolseley was victorious in the First Ashanti War. In 1882 he was made a general after putting down the revolt of the Arabi Pasha in Egypt. His last campaign was at Khartoum in 1884, when he came too late to rescue his friend, General Charles Gordon. As commander in chief of the army from 1895 to 1899, Wolseley made many reforms in army organization. See also RED RIVER REBELLION, P.K.N.

WOLSEY, WOOL zih, THOMAS (1473?-1530), was an English statesman and a cardinal of the Roman Catholic Church. For many years he was the most powerful man in England.

Wolsey was born at Ipswich, where his father was a butcher. He was educated at Magdalene College, Oxford University. Several years after his graduation he was elected a fellow of his college. In 1498 he was ordained a priest, and became rector of Limington, in Somerset. He later became chaplain to the Archbishop of Canterbury, and then chaplain to the English governor of Calais. Wolsey had made influential friends at Oxford. These friends, and his own driving ambition, helped his rapid rise to power. In 1507 he became chaplain to King Henry VII. The king often used Wolsey in diplomatic missions and rewarded him in 1509 by making him Dean of Lincoln.

When Henry VIII became king, Wolsey's affairs prospered.



Art Institute of Chicago
Thomas Cardinal Wolsey fought Henry VIII's break with the Catholic Church.

He became Canon of Windsor in 1511 and was given high church positions. In 1511 he also became a member of the Privy Council. Within a few years his was the controlling voice in all matters of state.

In 1514 he was made Bishop of Lincoln, and then Archbishop of York. The next year Pope Leo X made him a cardinal. Wolsey loved display and wealth. He lived in royal state and revelled in his power. His next ambition was to become Pope.

Like Henry VIII, Cardinal Wolsey's private life was open to question. But he was faithful to the king's interests and had great abilities as a statesman and administrator. Most of his efforts were spent in managing



Brown Bros.
Viscount Wolseley, British military leader

England's foreign affairs. He did so with skill. At first Wolsey favored France in opposition to the Holy Roman Empire. But Charles V later became Holy Roman Emperor and Wolsey wanted his support in the struggle for the Papacy. So he abandoned France and made an alliance with Charles V. The Holy Roman Empire then became so strong that Wolsey grew alarmed. To save the balance of power in Europe he again took sides with France against the empire. This brought on a war with Charles V in 1528. Wolsey failed in his campaign for the Papacy and blamed Charles V.

Wolsey's greed and ambition had won him many enemies in England. His enemies increased and influenced King Henry against him. But King Henry did not turn against Wolsey until a definite occasion arose.

Henry decided to divorce his wife, Catharine of Aragon, in order to marry Anne Boleyn. Divorce was forbidden by the laws of the Church. But the king was determined to be rid of Catharine. He turned the matter over to Wolsey. Wolsey did not approve of the affair and was slow in arranging the divorce. This delay aroused the anger of the king and also made Wolsey an enemy of Anne Boleyn and her friends. Wolsey's enemies chose this occasion to do away with him.

His fall was sudden and complete. A party of noblemen appeared and demanded the great seal of the kingdom from him. He was ordered out of his palace in London and his property was taken away from him. King Henry allowed him to remain archbishop of York, but stripped him of all his other honors. Wolsey retired to York, where he carried on his duties for a time. The House of Commons rejected a bill to execute him, but he was accused of treason and ordered to London to face the charges. In great distress he set out for the capital. He fell ill and died on the way. A.M.

WOLVERINE, *wool ver EEN*. The wolverine is a furbearing animal of the weasel family which lives in the northern woods of North America, Europe, and Asia. In the Old World it is called *glutton*. The wolverine is a relative of the badgers, skunks, and otters. It is a heavily built animal with short legs, and is about two and a half feet long. It looks something like a bear, but it cannot climb trees as bears do. Its hair is dark and shaggy with white markings, and makes a handsome fur. The wolverine is very fierce, and is one of the most powerful animals for its size in the world. The University of Michigan has taken the name as a nickname for their athletic squads, which are called "the Wolverines."

The wolverines of North America once roamed from the northern limits of the woods in Canada far to the south, into northern parts of the United States. They raided camps and stole bait from hunters' traps with great cunning. They often seemed to kill for the sheer love of killing, destroying many more animals than they could eat. Wolverines are now rare because they have been hunted ruthlessly. H.E.A.

See also ANIMAL (color plate, Arctic Lands and Seas).

Classification. The wolverine belongs to the *Mustelidae* family. Its scientific name is *Gulo luscus*.

WOLVERINE STATE. See MICHIGAN.

WOMAN. There are important differences between men and women beyond the primary fact that women are the mothers of men. Scientists are generally agreed

that men in general are stronger and quicker than women, although there are many individual exceptions to this rule. A champion woman tennis player can defeat thousands of ordinary men players, for example. Scientists have found little difference between men and women in the size of their brains or in their ability to think. Most tests have shown that the two sexes are about equal in mental ability, or that women are slightly superior. But there are emotional differences between men and women which serve to create mental differences. Most women think in terms of specific, personal needs and desires, while men are apt to think more abstractly. For this reason, women generally are more interested in social welfare than in science, and prefer psychology to philosophy.

These secondary differences between men and women have caused problems for mankind which have increased as civilization has advanced. In early times, and even in primitive tribes of today, women have fitted easily into simple social schemes. The physical differences between men and women made for a natural division of labor. The men were the hunters and fighters. The women tended the fire, prepared the meals, made the clothing, and cared for the children. Women did these things so well that they may be said to have begun civilization. They made the cave or other crude dwelling so comfortable that their men finally stopped roaming from one hunting ground to another. Primitive tribes began to make permanent homes, and to grow crops when game was not plentiful.

Many women are content to play a similar part today. They perform much the same duties of homemaking and child care as those of the cave woman, although many women now have laborsaving devices to help them. But millions of other women, either from choice or necessity, work outside the home. Here they find themselves in competition with men, in a world that still gives men most of the advantages and opportunities for advancement and leadership. For hundreds of years, women have been rulers either in fact or as powers behind thrones, but in general they did not attain the right to vote until the 1900's. In many parts of the world, they do not hold full citizenship even today. Their fight for equal rights, and for equal pay for equal work, is still being waged even in the most progressive democracies.

The Influence of Women in History

While mankind has been slow to grant woman full recognition, her influence on the course of human progress has been great. The thread of woman's influence stands out in the unraveling of all recorded history. Helen of Troy and Cleopatra are famous examples of ancient women whose influence was greater than that of any men of their time. Queen Isabella of Spain had much more to do with the success of Columbus' voyages than Ferdinand. Some of the most active chapters in human history occurred during the reigns of such feminine rulers as Catherine of Russia; Mary, Queen of Scots; and Queen Elizabeth of England. History is full of the influence of women who wielded their power behind the formal authority of a man, as did Madame de Pompadour during the reign of Louis XV of France.

But women in the mass have exerted greater and more

humanizing influences on the course of history than any of the so-called "great women" of the ages. Women were vital factors in all the great movements of mankind. Historians are generally agreed that the French Revolution could not have succeeded without the "citizenesses" who encouraged their men and even fought with them in the barricaded streets of Paris. The Pilgrim women who endured the hardships of the first winter in the New World provided deathless proof of the courage and endurance of women. The women of the American Revolution played no less a part in that fight against tyranny than did the women of France in the French Revolution. The American West could not have been settled without the skill and bravery of the pioneer women who labored and improvised to make homes in the wilderness, and even picked up guns to fight beside their men when hostile Indians attacked. French attempts to colonize Canada were largely a failure until the arrival of the "King's Brides," who became the wives of the bachelor colonists and helped them establish homes.

Beginning with the Industrial Revolution in the 1760's, women began taking their place in industrial life. Constantly increasing numbers of women have entered into activities that once were exclusively the domain of men. Today, there are no fields of enterprise which women have not entered, and where the best of them have not made outstanding successes. It is true that many of them have found serious conflicts between a career and their fundamental desires for love and marriage. Women have also found that their participation in trades and professions has been marked by unfairness in wage rates or salaries, and in opportunities to advance themselves. But many of these difficulties have been overcome by women in the democracies, and there is confidence among women that their remaining goals are attainable. Feminist leaders point out that women have usually achieved the goals they desire. In her book, *Woman as a Force in History*, Mary Beard reaches the conclusion that "the dogma of woman's complete historical subjection to men must be rated as one of the most fantastic myths ever created by the human mind."

Contributions to Culture

From the first, woman's entering into the arts and sciences was marked by outstanding contributions to the knowledge and culture of humanity. These contributions have been made in such fields as science, medicine, government, nursing, welfare, education, literature, journalism, sculpture, architecture, engineering, drama, international relations, labor organization, and aviation. Women have become governors of states, they have been elected to Congress, and they have been appointed to diplomatic posts. In the United States, women teachers are responsible for almost all education in the elementary grades. Hundreds of city school systems are made up almost entirely of women, and many women themselves believe this situation is out of balance. In other fields, the opportunities for women have been limited, but individual contributions have been great.

In **Social Advancement**, women have been particularly active. The number of outstanding women social workers is large, and is constantly increasing. One of the greatest social workers was Jane Addams, founder of

Hull House, the famous international settlement house in Chicago. Miss Addams inspired other leaders in social welfare, such as Florence Kelley, who became the first factory inspector of Illinois, and Julia Lathrop, the first chief of the Children's Bureau of the United States Department of Labor. In the field of welfare, Florence Nightingale, pioneer nurse, and Clara Barton, founder of the American Red Cross, are especially notable.

Leaders in the movement to improve woman's lot include Sarah Margaret Fuller, one of the most learned women of the 1800's, Lucretia Coffin Mott, a minister in the Society of Friends and promoter of many social and domestic reforms, and Elizabeth Cady Stanton, one of the earliest women lawyers and a founder of the suffragist movement. Margaret Sanger is noted for her work as an advocate of birth control and founder of the American Birth Control League.

In the field of education, many women rose above the ranks of their sister teachers. Anna Garlin Spencer, instructor in leading American universities during the early 1900's, first brought to public attention the need for women's participation in broad cultural activities in her book, *Woman's Share in Social Culture*. The Russell Sage Foundation for the improvement of social and living conditions was founded by a woman, Margaret Olivia Slocum Sage, who left several million dollars to the promotion of research into the social problems of the nation. Mary Van Kleeck, a director of the foundation, conducted valuable studies on industry and the problems of employees. Edith Abbott and Sophonisba Breckenridge founded the first school of social service administration at the University of Chicago.

In **the Sciences**, women have probably met their greatest test of their ability to demonstrate equality with men. During the 1890's Dr. M. Carey Thomas, later president of Bryn Mawr College, asked to attend a class at Johns Hopkins University school of medicine in Baltimore. No woman had ever before been permitted to attend the lectures, and Dr. Thomas was granted her request only on condition that she sit behind a screen. Today the "screen" has disappeared, and women have not only



American Pioneer Women shared hardships and dangers with their husbands in settling the wilderness.



U.S. Public Health Service

Women Scientists Are Increasing in Number. These research workers are performing an experiment on a guinea pig.

witnessed and studied new discoveries of science but many of them also have made valuable discoveries of their own.

When Madame Marie Curie and her husband announced the discovery of radium in 1898, the woman scientist won immediate fame. She was awarded the Nobel prize in 1903 and again in 1911 for her studies in chemistry and physics. Annie J. Cannon, winner of the Draper Medal for her work in astrophysics at the National Academy of Sciences, won recognition as one of the world's leading astronomers. She and her feminine associates at Harvard University discovered nearly five thousand new stars in a period of forty years. This number was nearly two thirds of all the variable stars that have been identified. Dr. Florence Rena Sabin became one of the world's outstanding scientists in the study of blood and blood diseases. The work of Lise Meitner in atomic physics played an important part in the development of the atomic bomb. Other women who rank high in the annals of science include Katharine Burr Blodgett, Irene Joliot Curie, and Alice Hamilton.

Women have rarely been given research fellowships or scholarships such as are offered men in almost every field of science. Often women have had to work hard in order to pay for the scientific study they wanted. But today there are few large research laboratories which do not employ large numbers of women workers.

In the Arts, women have shown the greatest variety of natural gifts. Because of their feeling for personal and concrete matters, women have accomplished the most in literature. Such novelists as Jane Austen, Sigrid Undset, the Brontë sisters, and Edith Wharton rank with the great male authors. Women make up more than half of the successful writers of fiction in contemporary literature.

There have been many good women poets, from ancient Sappho to Christina Rossetti, Edna St. Vincent Millay, and other moderns. Women have been less suc-

cessful at playwriting until modern times. Today, many of our most popular and highly regarded plays are written by women. There have been many highly successful actresses. Such names as those of Mrs. Sarah Siddons, Madame Eleonora Duse, Sarah Bernhardt, Ellen Terry, Lynn Fontanne, and Ethel Barrymore will live forever in the history of the theater. In music, there have been few outstanding women instrumentalists and even fewer composers. But women singers rank among the leading artists in the field. Amelita Galli-Curci, Alma Gluck, and Ernestine Schumann-Heink are among the opera singers who have withstood the test of time in greatness. There have been many talented women painters, but few of them have ranked among the great artists.

Woman in the Postwar World

War speeds up historical trends, and often changes social institutions long before people's ideas about them have caught up with the changes. There never has been a war which was purely a man's war. But World War II placed upon women responsibilities and obligations for which many of them were not prepared either educationally or culturally. The effects of the war were very different in various parts of the world. The position of women in society fell roughly into three ideas, depending on whether the country in which they lived had a communistic, democratic, or Fascist government.

The communistic view was that woman's problems could be solved only by complete equality with men, and that such equality could be established only under communism. The Fascist view held that woman must find her greatest happiness by limiting her activities to childbearing and domestic duties. The democratic idea was that women must have freedom as individuals to choose their own way of life.

Women under Communism. Nikolai Lenin, first Premier of the Russian Republic, declared that "real freedom for women is possible only through communism . . . There can be no real mass movement without women." Following Lenin's teachings, the entire educational and economic system of the Soviet Union has featured attempts to educate and train women for a place in communistic society. Laws have been adopted and social institutions set up to make it possible for women to participate equally in industry. These things were done partly because the nation was so desperately in need of the skilled and semiskilled labor which women could perform.

Some of the laws were changed after experience showed they would not work in their original form. At first, marriage and divorce laws made marriage a casual matter. Later, these laws were changed because responsibilities arose out of casual marriages which the government did not feel it could assume. These responsibilities, such as the rearing of children and the support of divorced wives, were again made an individual responsibility. The Soviets found that the rights of women to political office, to education, to marriage, parenthood, and similar things could be written into legislation, but that in practice the drive for equality for women depended upon social acceptance of the new forms. The Soviets also found that equal rights for women in industry made necessary certain provisions

for nursery care for children, maternity leaves, and special educational facilities.

Women of the Soviet Union took an important role during World War II. When the Nazi troops started to invade the country in 1941, Soviet women not only became guerrilla fighters, but joined the regular Red Army as well. Women from sixteen to forty-five years of age were drafted for war industries. Others, from fourteen to fifty years of age, were drafted for farm work. Before the war, women made up 37 per cent of the wage workers of the Soviet Union. In 1944 they formed from 45 to 50 per cent of the total industrial working force, and made up 70 per cent of the working force on farms.

A sharp change in Soviet educational policy was made in 1944 when coeducation was abolished in the lower schools, after having been in effect since the revolution. The change was based on the differences in the physical and intellectual rate of growth of boys and girls, and the special types of studies required by each sex. Soviet educators recognized that all jobs in society cannot be performed with equal success by men and women.

Women under Fascism. Fascist dictatorships came to power in Italy in 1922, in Germany in 1933, in Japan in 1935, and in Spain in 1936. These dictatorships were anticommunistic and also antidemocratic. Their success depended in part upon the co-operation of women and the acceptance by women of ideas that often were contrary to their own interests.

In Italy, laws were adopted to increase the birth rate by providing bonuses for mothers. This was done in order to help Benito Mussolini's plan for expansion of Italian territory. Italian women were given equal rights with men to become members of trade associations, or labor unions. They were permitted to continue with professional activities in medicine, law, philosophy, and mathematics. Margherita Sarfatti, a spokesman for Fascism in Europe and the United States, declared: "Italy is jealously guarding its women." And indeed it was. As the global war continued, Mussolini offered special food rations to women who had large families, dowries to young women to encourage them to marry, and layettes to married women for each new baby. In return, Italian women gave up their jewelry, including even their wedding rings, in order to furnish the gold with which Il Duce might carry on the war.

In Spain, the women of the aristocracy organized and sponsored women's work in the war against the republican government. The Church was active in the war against the republic, and aroused the devotion and loyalty of many Spanish women to the cause of monarchy and against democracy.

Germany for a long time described woman's position with an old proverb: "Kinder, Kuchen, and Kirche" (*Children, Kitchen, and Church*). German women were not permitted to attend regular colleges until 1901, when Heidelberg and Freiburg opened their doors to women students. After that, most of the German universities admitted women to study medicine, law, and other professions.

But when Adolf Hitler came to power in 1933, he ordered women "back into the home," and limited the number of women who could receive college training.

This was partly a measure to solve the unemployment problem by keeping the jobs for men. Although Hitler lowered the position of women in German society, he was helped in this by German women themselves. The *Frauenschaft* was the women's division of the Nazi party which raised money. The *Frauen Kampfband* got out the women's vote. Many feminists switched their devotion to Hitler, and followed with enthusiasm and faith the program which he set up. Among Hitler's group of devoted women disciples were Cosima Wagner, granddaughter of the immortal composer Richard Wagner, and Helena Bechstein, who gave thousands of dollars to the National Socialist movement.

In 1935 Hitler began to prepare for war, and reversed his policy about women in the home. Thousands of women were shifted from their duties in kitchens and on farms to work in factories and war plants.

In Japan the position of women was radically changed after the declaration of war against China and the invasion of Manchuria. As in Germany, Japanese women were drafted for work in war plants. Women commonly accepted the draft as a defense measure.

Before the war the position of women in Japan was a peculiar combination of Oriental and Occidental patterns. In some respects the Oriental attitude toward women was much more liberal than that of Western countries. For example, Japan has had ten empresses in its fairly short existence as a nation. But the old Japanese proverb, "obedience and modesty are essential virtues of the Japanese woman," was translated into laws making women the property first of their parents, and then of their husbands.

When Japan began to expand its industry, however, it became necessary to draw upon girls not yet of a marriageable age for the labor force. Japanese women workers toiled in textile factories and pottery plants for three years. During this time the woman worker was supposed



U.S. Civil Service Commission

A Woman Geographer Analyzes a Military Map



Madison Public Schools

The Profession of Teaching Attracts Many Women

to be able to save for herself a dowry large enough to enable her to go back to the farming community from which she came and secure a husband, or have her family arrange a marriage. Japanese factories adopted the dormitory system of housing its female workers within the factory walls. The workers had to put up with long hours, poor food, unsanitary living conditions, and cruel methods of discipline. The first factory act which regulated conditions of work for women in Japan was adopted in 1911, but was not actually put into operation until 1916. These factory laws, however, placed the responsibility for enforcing conditions upon the employer, who often ignored them.

Japan felt compelled to improve its factory system after the first conference of the International Labor Organization which was held in Washington, D.C., in October, 1919. The conference set international standards for the employment of women. The length of the working day was reduced for Japanese factory women, night work was abolished for women and children, and special sanitary measures were introduced.

The suffrage movement in Japan began in 1925 with an organization called the League for Women Suffrage. Fusaye Ishikawa was the leader of the movement. It met with little success. In 1931 a woman-suffrage bill was introduced in the Japanese Diet, or congress, but was defeated mainly because leaders of the Japanese army opposed it. The military men declared that "women are born pacifists and if granted the franchise will oppose war." The movement toward equal rights was also hampered by the poor educational facilities for women in Japan. There were only two major women's colleges, and their facilities were very limited. Few Japanese girls even entered high school.

The attitude of the Japanese Government and the army changed after the declaration of war on China. Leaders recognized that the actual production of guns, munitions, and other war needs would depend to a great extent upon the co-operation of Japanese women. Even the historically famous geisha girl was called upon to give up her age-old profession of hostess and entertainer,

and was placed in occupations in which her delicate and well-cared-for hands could be used for the production of precision instruments for airplanes and guns. The industrialization program probably did more than political agitation of suffragists to awaken the Japanese woman. She came to realize that she was first of all an essential member of the economic society, and secondly, that her age-old role of "obedience" was not in her own interests.

Thus, Japanese women were ready for a new place in society after the defeat of their nation and the Allied occupation in 1945. Eight months after Allied troops took over, Japanese women were taking positions in the police forces, as union leaders, and as mechanics in skilled and semiskilled occupations. General Douglas MacArthur, the head of the occupation forces, stressed the importance of the vote in making Japan democratic. In the first election, eighty Japanese women were candidates for parliament, and more than a third of the votes were cast by women. Thirty-six of the feminine candidates were elected.

The demands of war compelled Japanese women to take a political, economic, and intellectual role that would have taken years to achieve had not the war occurred. One result has been that many Japanese women want neither household nor factory work. They prefer office work. Most Japanese women, however, still cling to the conventional pattern of marriage and family.

Women in Democracy. The war also caused great changes in the status of women in democratic countries. But these changes were not so far-reaching as under other systems of government, because women of the democracies for the most part had already made great progress toward equality.

China probably showed the least progress in this direction. Educational opportunities have been possible for only a small percentage of Chinese women. Most Chinese women who have received any specialized training have come to the United States for it, or have attended American schools in China. There are so few of these women, however, that their influence has been very weak. The mass of Chinese womanhood remains in a feudal position.

In the Philippines, the position of woman is probably more advanced than in any other Oriental country. The original family system of the primitive Filipinos was the *matriarchy*, in which the woman was the head of the family. When Spain conquered the Philippines, women were reduced to a subordinate position economically, politically, and socially. The women of the lower classes had no social or political standing, and enjoyed very little in the way of educational or intellectual privileges.

The pattern of equality for men and women was re-established when the United States took control of the Philippines. Coeducational schools and universities did much to help. Woman suffrage was established in the Philippines in 1927. Philippine women were the backbone of the resistance movement when the Japanese army overran the islands. They fought in the guerrilla forces. They worked as nurses and as doctors for the loyal fighters, and served in other ways to resist Japanese domination.

Women in France were very active in the resistance

movements during the war. When the Nazis took over the French Government, Madame Lucie Aubrac was one of the first women to escape from France and go to Algiers as a representative of the women of the Free French underground. She worked with many of the resistance organizations, helping French men and women to escape German domination. At the same time, she helped build up resistance organizations in many centers of North Africa.

Many people believe that the women of the resistance movement in France were the logical descendants of the women who fought for freedom in the French revolutions of 1789 and 1848. In gratitude to the courage and dependability of women during the period of Fascist rule in France, a law was adopted in 1944 giving women the right to vote in national elections. Before this, they had had the right to vote only on local matters. France was the last of the modern industrial nations to recognize that political equality for both sexes was essential in the struggle for democracy.

In the 1945 elections, the women of France made use of their voting rights for the first time. Women were elected as mayors in several boroughs, and were chosen to sit on juries in many of the special courts which tried persons charged with collaborating with the Nazis. Thirty-three women were elected to the French Assembly, and women made up one tenth of the members of the Chamber of Deputies.

In Great Britain, long the center of a hard struggle for industrial and political democracy, women were granted voting privileges after World War I. During World War II, British women were organized into a giant labor army for the purpose of carrying on the war. There were women representatives in Parliament, as well as women policemen, bricklayers, machinists, and bus and taxi drivers. The WRENs, WAAFs, and ATS were women's organizations under the direction of British military leaders. Their members flew airplanes, directed and operated radar equipment, and worked in more than 120 trades both in the United Kingdom and abroad.

In the postwar period, however, there were attempts to place women back in her old position. Women were asked to give up their jobs to returning veterans, or to accept unequal pay for work which had brought them higher wage rates during the war. The main-fight was on the issue of equal pay for equal work. Parliament defeated a measure to establish the same pay for women teachers as for men. This occurred in spite of the fact that the Labor government of Britain had a large number of women representatives in Parliament, and that the Minister of Health and the Minister of Home Security are both women.

In South America, where women have been especially new to political action or social responsibilities, there has been remarkable progress in the position of women. During the war period, women of Brazil, Chile, and Mexico made special progress in educational and social work. Many women attended Pan American conferences, and learned much about the activities of women in North America. There are no "feminine blocs" in the South American countries, but there has been a definite recognition that the woman's vote was important.

Most of the South American representatives to the Inter-American Commission of Women in the summer of 1946 discussed not only the problem of equal rights but also the particular social questions of concern to women. These problems included maternity care, the establishment of child-welfare stations, better public health facilities, and better education.

In Canada, women played an important part throughout World War II, not only as individuals responsible for the maintenance of morale, but also as workers in naval and military activities, in research, in education, and in the factories and shops producing war materials.

In the United States, the war period was marked by indecision on the part of women. Many of them were unable to decide between work and family. During the war, about eighteen million women were part of the labor supply responsible for the production of war materiel. Women held important jobs in airplane and automobile plants and in precision instrument factories.

In 1945 the War Labor Board established the principle of giving men and women equal pay for equal work. This principle was universally adopted in all industries having government contracts. Women also joined the WAVEs, the WACs, the SPARs, and the Marines. Kindergartens and nurseries were sponsored by private industry in order to make it possible for married women to work in factories. Housing projects were developed near the plants. Special regulations were set up to provide late shopping hours in those communities where women workers found it difficult to carry on their functions as housewives as well as workers.

The number of women who joined trade unions reached a new high during the war. More than half of the unions had no women members until the war began. Many union contracts established equal pay for equal work by women. In four out of every five of these contracts, women were given the same seniority rights as men. Women made up one third of the total membership of the United Automobile Workers and one fourth of the membership of the United Electrical, Radio, and Machine Workers. Other unions with large women memberships included the United Textile Workers, the Amalgamated Clothing Workers, the Food and Tobacco Workers, and the National Federation of Telephone Workers.

After the war, many of the jobs held by women were taken over by returning servicemen. Many women were glad to give up their jobs. But others still had to work for a living. These women believed it was essential for the nation to provide enough jobs at high enough pay to enable them to support themselves. The program of the National Woman's Trade Union League emphasized these four "freedoms" of working women: (1) the right to work regardless of need, (2) the right to equal pay, (3) the right to equal seniority rights, and (4) the right to legal safeguards. This program has been adopted by many other women's organizations which are actively working for social legislation.

The close of the war found women in the United States playing an increasing part in politics and government. The postwar Congress had more women members than any previous Congress in the history of the nation. Particularly active in striving for better stand-

ards for women workers were Eleanor Roosevelt, Representatives Helen Gahagan Douglas of California, Mary Norton of New Jersey, and Emily Taft Douglas of Illinois; former Secretary of Labor Frances Perkins, and Frieda Miller, head of the women's bureau of the United States Department of Labor. T.W.

Related Subjects: The reader is also referred to the list of Rulers in the BIOGRAPHY section of the READING AND STUDY GUIDE and to the following articles in THE WORLD BOOK ENCYCLOPEDIA.

SOME FAMOUS WOMEN

Addams, Jane	Lyon, Mary
Astor (Lady)	Meitner, Lise
Austen, Jane	Millay, Edna St. Vincent
Barrymore	Mitchell, Maria
Barton, Clara	Nightingale, Florence
Bernhardt, Sarah	Palmer, Alice Freeman
Blackwell, Elizabeth	Pinckney, Elizabeth Lucas
Buck, Pearl	Rossetti, Christina G.
Cannon, Annie Jump	Sage, Russell, and Margaret
Cassatt, Mary	Sanger, Margaret
Curie	Schumann-Heink, Ernestine
Cushman, Charlotte	Siddons, Sarah Kemble
Duse, Eleonora	Spencer, Anna Garlin
Fontanne, Lynn	Stowe, Harriet Beecher
Fuller, Margaret	Terry, Ellen Alicia
Galli-Curci, Amelita	Undset, Sigrid
Glasgow, Ellen A. G.	Warren, Mercy Otis
Gluck, Alma	Wharton, Edith N. J.
Howe, Julia Ward	Willard, Emma
Lagerlöf, Selma O. L.	Willard, Frances E. C.
Lathrop, Julia Clifford	Woolf, Virginia

UNCLASSIFIED

Colonial Life in America	Seraglio
Family	Woman Suffrage (with list)
Harem	Woman's Club (with list)
Home Economics	Women's Bureau
Home Life	Zenana
Pioneer Life	

WOMAN'S CHRISTIAN TEMPERANCE UNION. The Woman's Christian Temperance Union is an international organization of women who believe in personal total abstinence from all alcoholic beverages, and who work for the abolition of the liquor traffic. The organization's broad program is promoted through the Youth Temperance Council (high school and college), the Loyal Temperance Legion (grade-school age), and the twenty educational departments of work. The program includes scientific narcotic education, good citizenship, child welfare, and world peace. The W.C.T.U. has played an active part in getting laws passed which provide that young people in the public schools be taught the scientific effects of alcohol and other narcotics. Correlation of temperance lessons into the church school program is another of its achievements.

The organization has branches in all the states of the Union, and in Alaska, Hawaii, Puerto Rico, and the Virgin Islands. It was founded in 1874. The W.C.T.U. grew out of the Women's Temperance Crusade of 1873. During this campaign, women church members went into saloons, sang hymns, prayed, and asked the saloonkeepers to stop selling liquor. Within a few weeks the Temperance Crusade swept over twenty-three states, and resulted in the closing of thousands of liquor selling places throughout the nation.

A group of Crusaders attending the Chautauqua Sunday School Assembly in 1874 issued the call which re-

sulted in the organization of the National Woman's Christian Temperance Union in November, 1874, at Cleveland, Ohio. Its first president was Mrs. Annie Wittenmyer, and the second was the noted educator and reformer, Frances E. Willard.

The organization grew rapidly, and its influence increased with its growth. It worked through schools, churches, and other organized groups. As a result of the widespread temperance movement sponsored by these organizations, many towns, counties, and states passed laws forbidding the sale of alcoholic drinks. Finally the Eighteenth Amendment to the Constitution of the United States (passed in 1919) prohibited the manufacture, import, export, and sale of alcoholic beverages within the United States. This amendment remained in force between 1920 and 1933, when it was repealed by the Twenty-first Amendment.

In 1883 Miss Willard founded the first international organization for women, called the World's Woman's Christian Temperance Union. It is made up of women's temperance groups in fifty-four countries and has about 1,000,000 members. The international badge, a bow of white ribbon, is used in all countries.

The W.C.T.U. has national headquarters in Evanston, Ill. The international organization has its headquarters in Brooklyn, N.Y.

L.G.M.

See also ANTI-SALOON LEAGUE; GOOD TEMPLARS, INTERNATIONAL ORDER OF; PROHIBITION; TEMPERANCE; WILLARD, FRANCES E.

WOMAN'S CLUB. There have been women's clubs for hundreds of years. Records show that the matrons of ancient Rome often met in discussion groups, or clubs, to talk about matters of etiquette. But women's clubs have changed since the days of ancient Rome. Present-day women's clubs grew out of the Industrial Revolution. During the 1800's and early 1900's, machine production took the place of manufacture by hand. Many things that women had made in their homes were now manufactured in factories. Women found that they had more leisure time than ever before. Many women entered trades and professions. They began to demand social rights equal to those that men enjoyed. Many women's clubs were organized in the United States and Europe, and more and more women joined them. Through these clubs, women began to take an increasing part in public affairs.

In the United States, the first women's clubs were quilting bees and social circles, which gave the pioneer women opportunities to get together. The first women's club with a constitution and bylaws was the Minerva Club, founded in 1859 at New Harmony, Ind.

Today, there are many kinds of clubs in the United States. These clubs may be grouped into a few broad classes, according to their activities and purposes. But these classes overlap. A club often takes on new activities and purposes as it goes along. Most clubs now take a much greater part in public affairs than they did at the time they were founded. Many of the women's clubs of the United States are loosely linked together through the General Federation of Women's Clubs. See WOMEN'S CLUBS, GENERAL FEDERATION OF.

Social Clubs. Most of the women's clubs of the United States are social clubs. Early social clubs were founded

chiefly to provide recreation and opportunities for conversation. But in the 1800's many social clubs were organized to promote culture. Women studied such subjects as literature, art, music, and household economy. Later they became interested in child study, questions of social reform, and world affairs. As education became available to women, social clubs began to place ever-increasing emphasis on educational opportunities for their members.

Practical Clubs are those organized for work, rather than for study, self-improvement, or recreation. It is often hard to tell social clubs and practical clubs apart. Many social clubs have programs of welfare work, and many practical clubs have social programs. One type of practical club is the church club, which usually devotes all its efforts to church and community work. Other practical clubs include lodge and trade union auxiliaries, and patriotic clubs. Many women's clubs of the practical, or working type, exist to provide support for public libraries, community houses, or social agencies that benefit various communities.

Women's clubs of almost all types are interested in community affairs. The organizations promote "clean-up days," which bring order and cleanliness into back yards, vacant lots, and alleys. The members of women's clubs work to get playgrounds, good schools, and juvenile courts for children of their communities. They also support reform movements for better management of reform schools, state hospitals, and prisons.

Women's interest in community problems has broadened into interest in world-wide problems. Women's clubs have been organized to fight against slavery, and for temperance and world peace. Many clubs have set up regular departments or divisions to promote better relations among nations through study and action.

Political Clubs. In the early 1900's, political, or suffrage clubs were very active in the United States and Great Britain. Members of these clubs waged a strong campaign to gain the right for women to vote. Once women received the vote, these political clubs turned their attention to the problem of teaching women to vote intelligently. Today political clubs provide special courses of study for their members. They hold meetings before elections at which candidates of all parties are often invited to speak. They study the records of all candidates to determine their honesty and concern for community welfare.

Professional Clubs. When women became business executives and entered the professions, they began to organize their own professional clubs. Most of the large cities have press clubs for women newspaper writers. There are also special clubs for women nurses, doctors, and lawyers, as well as for business women.

Canadian Clubs. Canada, like the United States, has many women's clubs. These clubs have social, political, business, and professional purposes. Many of the clubs are interested in religion, art, music, literature, or travel. One of the best known of the Canadian women's clubs is the Imperial Order of the Daughters of the Empire. This organization has more than 30,000 members, organized into about 500 chapters. The club has taken a leading part in patriotic work, especially in wartime.

L.J.D.

Related Subjects. The reader is also referred to the following articles on women's organizations:

CIVIC

Altrusa Clubs	League of Women Voters
Business and Professional Women's Clubs	Zonta International

PATRIOTIC

American Legion Auxiliary	Daughters of the Confederacy
Colonial Dames of America	Gold Star Mothers
Daughters of the American Revolution	Mount Vernon Ladies Association
	Woman's Relief Corps, National

UNCLASSIFIED

American Association of University Women	Women's Clubs, General Federation of
Hadassah	Women's Trade Union League of America, National
Junior League	Young Women's Christian Association
P.E.O. Sisterhood	Young Women's Hebrew Association
Sorority	
Woman's Christian Temperance Union	

WOMAN'S RELIEF CORPS, NATIONAL. This is the oldest woman's patriotic organization in the United States. In July, 1883, it was voted the official auxiliary of the Grand Army of the Republic, an organization of veterans of the Union Army in the War between the States. The Woman's Relief Corps is the only existing patriotic organization which was founded solely on the basis of loyal womanhood, regardless of kinship. The organization has headquarters in Springfield, Ill.

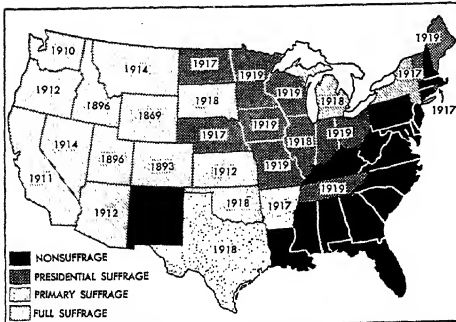
The aims of the organization were and are to aid and assist the Grand Army of the Republic, and to perpetuate the memory of its dead. The organization also works to assist those Union veterans who need help or protection, and to aid their widows and orphans. Members of the Woman's Relief Corps encourage universal liberty, equal rights, and love of country. See also **GRAND ARMY OF THE REPUBLIC.** C.F.H.

WOMAN'S RIGHTS. See **WOMAN SUFFRAGE.**

WOMAN SUFFRAGE, *SUF rĭj*. For hundreds of years, only a few persons were allowed to participate wherever votes were taken on public affairs. Many groups of adults were excluded from the suffrage, including those who did not own property, and those who had not paid a special tax. Except in a few instances, women were not permitted to vote. This was due to reasons which sound so unconvincing today that it is hard to believe they were ever taken seriously.

Persons generally believed that a woman did not have enough judgment to choose a political candidate. They argued that a woman's reason was not equal to a man's. But the defenders of woman suffrage would often reply in the words of Voltaire: "All the reasonings of men are not worth one sentiment of women." It is true that there are ignorant women, but there are also ignorant men. Many persons have pointed out that the arguments against woman suffrage are arguments against democracy itself.

The Woman's Movement in the United States. The struggle for woman suffrage reached its peak during the late 1800's and early 1900's. But women began to have a share in governmental affairs before that time. The Old Province Charter of Massachusetts colony gave



Woman Suffrage Before the National Amendment. Before the adoption of the Nineteenth Amendment to the Constitution, eighteen states did not permit women to vote, twelve states permitted them to vote only in presidential elections, and two states permitted them to vote in primary elections. Only sixteen states offered full voting privileges to women. Dates shown are the years in which these privileges were granted.

women property holders voting rights from 1691 to 1780. After Massachusetts adopted a state constitution, these women could vote for all officers except the governor and members of the legislature. The Continental Congress left the suffrage question to the individual states. New Jersey was the only state which permitted women to vote. In 1807 this state took away the women's voting privilege.

The movement against slavery had a great effect on woman suffrage. Women in the North who opposed slavery now demanded equal civic rights with men. Most persons poked fun at the women's demands, but a few statesmen and preachers supported them. The first convention to discuss votes for women met in 1848 at Seneca Falls, N.Y. Four pioneer American suffragists, Elizabeth Cady Stanton, Lucretia Mott, Martha Wright, and Mary Ann McClintock, framed a resolution which demanded that women be given equal rights as citizens, and the resolution was adopted.

In 1868 the Fourteenth Amendment became part of the Constitution of the United States. This amendment gave voting rights to all males in the country, but women were still not granted suffrage. Thoroughly angered, the women decided to band together for action. In May, 1869, the National Woman Suffrage Association was founded by Elizabeth Stanton and Susan B. Anthony. The organization set out to win a national amendment which would grant voting rights to women. In November, 1869, the American Woman Suffrage Association was formed. Its president was Henry Ward Beecher. This organization fought for state amendments which would grant woman suffrage. In 1890 the two organizations joined together and fought for both state and national woman suffrage amendments. The new organization became known as the National American Woman Suffrage Association.

Campaigns in Washington, D.C., for a woman suffrage amendment began in 1912. In 1917 the Judiciary Committee of the House of Representatives placed the Susan B. Anthony Federal Suffrage amendment before the House. This amendment read: "The right of the citizens of the United States to vote shall not be denied

or abridged by the United States, or by any state, on account of sex." In 1919 both houses of Congress approved the amendment, and it was sent to the state legislatures for ratification.

The approval of thirty-six states was needed before the suffrage amendment could become law. Many persons thought that three or more years would pass before any action would be taken. But the states acted with surprising speed. In many states the governors called special sessions to pass upon the amendment. By the end of 1919, twenty-two states had ratified the amendment. Illinois and Wisconsin were the first to declare in favor of woman suffrage. Tennessee was the thirty-sixth state to register approval. In August, 1920, the Secretary of State issued the notice of ratification, and the Nineteenth Amendment became part of the Constitution.

In Canada. The Dominion granted full woman suffrage in federal elections in 1918, but not all Canadian provinces have given women this privilege. In six provinces, women may vote only in municipal and school elections. These provinces are Nova Scotia, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. In Quebec, women may vote in provincial elections and they may hold seats in the legislature.

In Other Countries. In 1906 Finland became the first European country to permit women to vote and to give them seats in Parliament. Women have voted in Norway since 1907, and in Iceland and Denmark since 1915. Women in these countries may also be elected to lawmaking bodies. The women workers of Mexico voted for the first time in 1936. In 1938 the Mexican Congress granted voting rights to Mexican women. In 1893 New Zealand became the first British colony to grant woman suffrage. Australia has had universal suffrage since 1908.

World War I did much to advance the cause of woman suffrage throughout the world. Women had worked together with men in the emergency, and they had proved their intelligence and ability. Most of the important countries soon adopted woman suffrage.

By 1935 France and Italy were the only large countries in Europe that did not permit women to vote. In that same year, Turkish women voted in national elections for the first time. In 1944, after the liberation of France, French women voted for the first time. The women of Italy were given the right to vote on January 30, 1945. In 1931 the Spanish republic granted full political rights to women over twenty-three years old. Belgian women may not vote, but they may be elected to Parliament. Great Britain granted complete woman suffrage in 1928, and women are also eligible for public office. Margaret G. Bondfield, appointed British Minister of Labor in 1929, became the first woman to hold a Cabinet position. In the Soviet Union, all workers over eighteen years old may vote, although the votes of neither men nor women mean much under the Soviet dictatorship. Woman suffrage is making some progress in Asia. Many provinces of India allow women to vote. Women in China and Siam have been permitted to vote since 1932. Women in Japan first voted in elections held early in 1946.

In Latin America, Uruguay gave women full political rights in 1932. Since 1934, Brazil has permitted women over eighteen years old to vote. In Ecuador, women voted for the first time in 1939. Argentina, Peru, and Chile allow women to vote in some elections. In Puerto Rico, women may vote if they are able to read and write. Women of the Philippines have been permitted to vote since 1937.

F.F.B.

Related Subjects. The reader is also referred to:

Anthony, Susan Brownell	Pankhurst, Emmeline
Catt, Carrie Chapman	Goulden
League of Women Voters	Shaw, Anna Howard
Livermore, Mary A. R.	Stanton, Elizabeth Cady
Lockwood, Belva A. B.	United States Constitution
Mott, Lucretia	(Article XIX)
	Walker, Mary E.

WOMBAT is a thickset, burrowing animal from two to three feet long. It lives in Tasmania and southern Australia. The wombat is highly prized for its tough hide and long, coarse fur of a yellowish-black or grayish brown color. The fur makes rugs and mats which wear well. The bushmen value wombat flesh for food. Wombats dig large earth burrows as dwelling places. They come out only at night to feed on roots, vegetables, and leaves, for they are strict vegetarians. As pets they show great affection for their masters. There are several different kinds of wombats. They belong to the order of mammals, the marsupials, which carry their young in pouches. See also **ANIMAL** (color plate, Australia, New Guinea, and Tasmania).

R.T.H.A.

Classification. The wombats belong to the family *Vombatidae*. The common species is *Vombatus hirsutus*.

WOMEN ACCEPTED FOR VOLUNTEER EMERGENCY SERVICE. See **WAVES**.

WOMEN'S AIR FORCE SERVICE PILOT TRAINING. See **WASP**.

WOMEN'S ARMY CORPS, formerly **WOMEN'S ARMY AUXILIARY CORPS**. See **WAC**.

WOMEN'S AUXILIARY AIR FORCE (Great Britain). See **WASP**.

WOMEN'S AUXILIARY FERRYING SQUADRON. See **WASP**.

WOMEN'S BUREAU is a division of the United States Department of Labor. It was founded to promote the welfare of women who work for wages. The Bureau sets up standards for improving working conditions, increasing the efficiency of woman workers, and providing more and better job opportunities for them. It gives advice and information to trade unions, women's clubs, state and Federal agencies, and other groups. The Bureau also works with these groups to secure better laws dealing with women wage earners and better enforcement of the laws that have already been passed. The Women's Bureau was founded in 1918.

WOMEN'S CLUBS, GENERAL FEDERATION OF, is a world-wide organization of women's clubs. The Federation joins 16,500 local clubs in sixty-three countries into an international organization. These clubs have a total membership of over 3,000,000 women. The motto of the Federation is "Unity in Diversity." The organization works to promote better relations among nations.

The General Federation of Women's Clubs was founded in 1890. In this year, Sorosis of New York, which was one of the oldest clubs in the United States,

invited delegates from various other clubs to meet with Sorosis members in a general convention. The delegates set up the framework for the General Federation of Women's Clubs. The organization has headquarters in Washington, D.C.

T.S.W.

See also **WOMEN'S CLUB** (with list).

WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM, formerly **WOMEN'S INTERNATIONAL PEACE CONGRESS**. See **ADDAMS, JANE**.

WOMEN'S RESERVE, UNITED STATES COAST GUARD. See **SPARS**.

WOMEN'S RESERVE, UNITED STATES MARINE CORPS. See **MARINE CORPS WOMEN'S RESERVE**.

WOMEN'S RESERVE, UNITED STATES NAVAL RESERVE. See **WAVES**.

WOMEN'S TRADE UNION LEAGUE OF AMERICA, NATIONAL. This is an organization of women who are interested in the American labor movement. The organization acts as an information clearinghouse for labor unions, and for individuals and groups interested in the welfare of women workers. The League was founded in Boston in 1903. Today it has more than 1,000,000 direct and affiliated members and fifteen local leagues. Both women's trade unions and women's auxiliaries of men's unions are affiliated with the League. The organization also has many individual members. The chief purpose of the League is to organize women workers into trade unions. Its representatives also work for laws favorable to labor, for shorter hours of labor, for a higher standard of living, and for equal pay for equal work regardless of sex or race. The League has headquarters in Washington, D.C.

E.Ch.

WOMEN VOTERS, NATIONAL LEAGUE OF. See **LEAGUE OF WOMEN VOTERS OF THE UNITED STATES**.

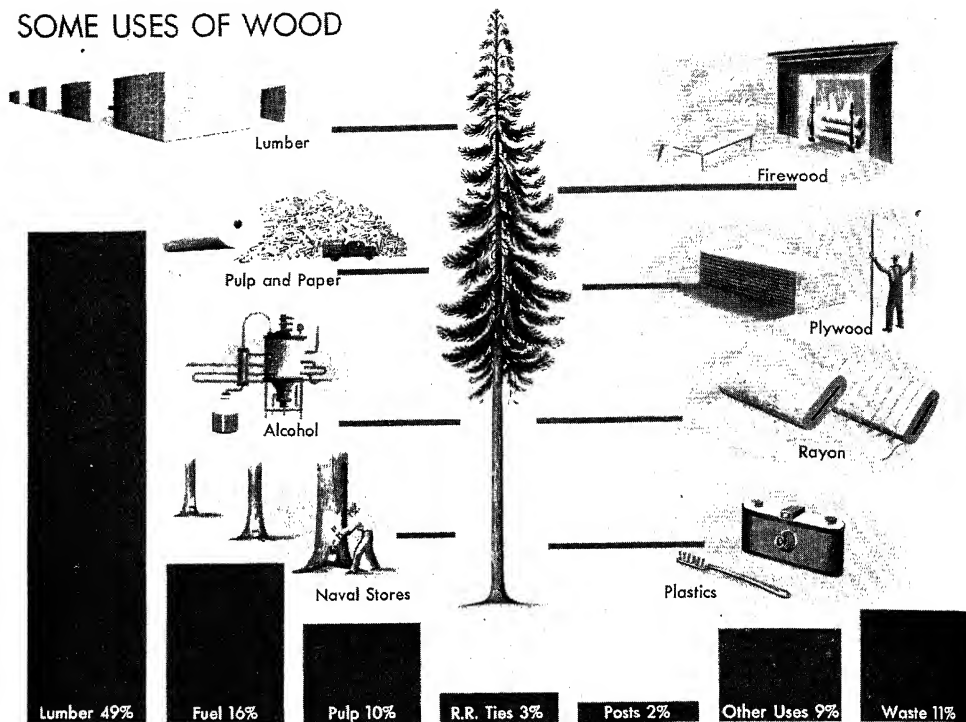
WONDER STATE. See **ARKANSAS**.

WOOD is made up of tough, fibrous cells. These carry the sap and support the living stem or trunk of a tree. Most full-grown woody plants have three main layers. These are the *bark* outside, a living layer of *cambium* underneath the bark, and the *woody layers* beneath the cambium. The cambium produces both bark and wood. The bark is partly lost from the outside, but the wood remains and builds up the plant's body.

The two chief kinds of wood are "softwood" and "hardwood." Most softwood comes from the cone-bearing trees, such as pines. It is made up mostly of long cells called *tracheids*. The tracheids formed in the spring are larger and have thinner walls than those which form later in the summer. This difference in size forms the rings of growth that tell the age of the tree. Softwoods and hardwoods also have ribbonlike wood rays extending from the cambium toward the center of the tree, and into the bark. Hardwood has other cells besides tracheids and ray cells. There are long, narrow *fiber tracheids*, and many *vessels* (called pores when seen in cross section).

New wood cells contain living protoplasm. Later, most of the cells lose their protoplasm, so wood is mostly dead material. But the part near the cambium supplies channels for sap even after it is dead. This part is called the *sapwood*. The inner woody cells may become filled with various materials. They form the *heartwood*, which is more durable than the sapwood, but no stronger at

SOME USES OF WOOD



the same moisture content.

Related Subjects. The reader is also referred to:
Cellulose
Lignin
Logwood
Lumber

W.M.HAR.

Plywood
Stain
Tree
Wallboard

WOOD, CLEMENT (1888-), is an American writer. He is probably best known for writing the words to the songs "The Glory Road" and "Short'nin' Bread." Most of his many novels and biographies are highly sensational. Wood was born in Tuscaloosa, Ala., and studied at the University of Alabama and Yale University. He became a lawyer in Birmingham, and for a time was a city judge until he was removed from office. L.J.

WOOD, GRANT (1892-1942), was one of the first regional painters in America. His paintings of Middle Western life are noted for the unusual way in which they picture familiar subjects. The satirical character analysis in his paintings has made Wood one of the foremost painters of modern times and one of the most discussed.

Wood, the son of a farmer, was born in Anamosa, Iowa. He received little



University of Iowa
Grant Wood painted the rolling farm lands of Iowa.

education. For a short time Wood studied art at the University of Iowa, and later he studied at the Chicago Art Institute. In 1925 he went to Paris and became an Impressionist painter. But he soon became dissatisfied with this style and returned to Iowa to paint the land he knew best. M.B.

See also **PAINTING** (Great American Paintings, color plate, American Gothic).

His Works include "Women with Plant"; "Daughters of the Revolution"; and "Dinner for Threshers."

WOOD, LEONARD (1860-1927), was an American soldier and colonial administrator. As military governor of Cuba from 1899 to 1902 he played a large part in stamping out yellow fever. Under his direction the swamps and mosquito-ridden areas were cleaned up and Cuba became a more healthful place in which to live.

Wood was born in Winchester, N.H., and studied medicine at Harvard University. In 1886, after two years of private medical practice, he was appointed an assistant surgeon in the army. During the early part of the Spanish American War he commanded the famous "Roughriders," of which Theodore Roosevelt was second in command. In 1903 Wood became governor of the Moro province in the Philippines, and later was commander of United States forces in the Philippines.

He was appointed chief of staff in 1910 and held this post for four years. Wood was one of the leading candidates for the Republican presidential nomination in 1920 but was defeated. The following year he was ap-

pointed Governor General of the Philippines and remained in this position until a few weeks before his death.

F.T.M.

WOOD ALCOHOL (chemical formula, CH_3OH), is an important chemical that can be made by heating hardwood (generally as sawdust) in the absence of air. This process is called destructive distillation. Wood alcohol is also called *wood spirit*, *methyl alcohol*, and *methanol*. It is a colorless liquid with a well-known alcohol odor. It mixes with any amount of water and boils at 149° Fahrenheit.

Wood alcohol is a deadly poison if taken into the body. It paralyzes the optic nerve. Cheap liquors made with wood alcohol have caused many deaths and many cases of blindness. Even on the surface of the body, wood alcohol may produce serious poisoning. Laws forbid manufacturers to use it instead of grain alcohol in tinctures, lotions, and cosmetics.

Wood alcohol is widely used in industry. It dissolves fats, gums, oils, and varnish, and is one of the raw materials used in manufacturing formaldehyde. It is also used to preserve anatomical specimens.

In 1924, German chemists produced a synthetic wood alcohol from carbon monoxide gas and hydrogen. Enor-

mous amounts of synthetic wood alcohol are now being manufactured in the United States.

G.L.BE.

See also ALCOHOL.

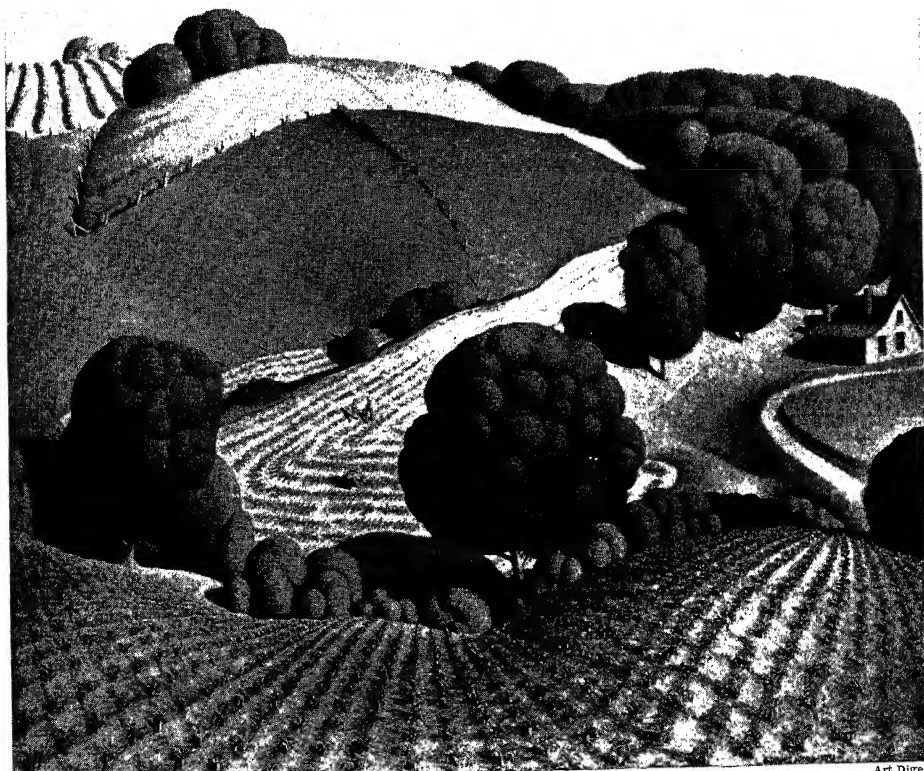
WOOD ANEMONE. This attractive plant is grown chiefly in rock gardens. The wood anemone is often called the *windflower*. It is grown in the eastern part of the United States, in Europe, and in Siberia. The plant is a perennial and grows year after year without being replanted. The root of the wood anemone is a tuber, which is thick and fleshy like a potato. The plant has a single whorl of leaves near the base of the stem. The flowers of the wood anemone are the showy parts of the plant. They are white and cup-shaped and grow singly. The plant grows best in moist, sandy soil. It is reproduced by seeds or by a cutting of the root. See also ANEMONE.

T.J.

Classification. The wood anemone belongs to the genus *Anemone*. The American species is called *A. quinquefolia*, and the European species is called *A. nemorosa*. They belong to the family *Ranunculaceae*.

WOODBINE is the name of common European honeysuckle. The name is also sometimes given to the Virginia creeper. See also HONEYSUCKLE.

J.J.L.



Art Digest

"Young Corn," Painted by Grant Wood in 1931, Is One of His Earliest Regional Works



The Art of Wood Carving is a Very Old One. At left is an Egyptian figure carved of cedar nearly 4,000 years ago. The

Metropolitan Museum of Art
Chinese figure (middle) dates from the Ming dynasty. The beard is real hair. At right is a prize-winning modern ebony carving.

WOOD-BLOCK PRINT. See BLOCK PRINTING; JAPAN (Arts and Crafts).

WOOD BORER. See BEETLE (Kinds of Beetles [Wood-boring Beetles]); INSECT (color plate, Beetles).

WOOD BUFFALO NATIONAL PARK. See CANADA (National Parks Set Aside as Animal Preserves).

WOODBURY, LEVI (1789-1851). See PIERCE, FRANKLIN (Political and Public Activities).

WOOD CARVING. For at least five thousand years, men have carved ornaments, figures, or useful objects from wood. Wood carvings may decorate the surface of an object, such as a door panel or a chest. The wood carver also may make separate objects to stand alone. This is called carving in the round.

How the Wood Carver Works. The easiest woods for the wood carver to cut and finish are basswood, white pine, black walnut, and mahogany. Other good woods for carving include oak, beech, holly, sycamore, and redwood. The wood should be well seasoned, and have a smooth texture and color. A master carver often uses wood burls of knotted wood for a beautiful surface pattern.

Tools Needed. Wood carving need not require many tools. One or two very sharp knives and a sharp chisel will do for the beginner. A penknife makes the best tool for carving small objects. For larger pieces, a jackknife or hunting knife is needed. The blades must be of good steel, and must be kept as sharp as a razor if results are to be good.

How to Cut the Wood. The beginner should practice his strokes on a piece of soft wood about one fourth inch or three eighths inch thick. An outline of a simple design should be drawn on the face of the wood. Then the figure is carved out, stroke by stroke. The second piece may be of thicker wood, with the edges rounded off. Then a simple figure may be carved in full. To do this, the carver selects or cuts a block of wood in the size needed.

He draws a separate view of the figure in outline on each side. First he carves out the front and back, and then the sides. Simple lines cut with single strokes are best. The sharp edges of the stroke are left to help show the planes of the figure.

History of Wood Carving. Wood carving is one of the oldest arts. Examples have been found in Egypt which were made about three thousand years before Christ. The Bible also mentions its use. Historical accounts tell of Greek wood carvings from very early times. The wood carvers of the Middle Ages helped to decorate the great cathedrals. Many artists of the Renaissance carved in wood as well as in stone. One of the greatest wood carvers was Grinling Gibbons (1648-1720), who carved the stalls of Saint Paul's Cathedral in London.

After the middle of the 1800's, wood carving attracted less interest. But in Switzerland many peasants still carve wood as a regular occupation. Fine wood carving is also done by some artists in America as well as in Europe. Orientals have long done fine carving. Many persons carve wood as a hobby.

W.M.M.
See also CARVING; FURNITURE; HOBBY (Books about Hobbies).

WOODCHUCK. The woodchuck, sometimes called *ground hog*, is a small mammal of North America. There is a false belief, or superstition, that this animal is able to predict the weather. It is said that the ground hog comes out of his burrow on the second day of February to observe the weather. If he sees his shadow, he decides that spring is still six weeks away, and crawls back in to sleep a few more weeks. The story has no basis in fact, except that the woodchuck does hibernate during the winter and it does live in a burrow.

There are several species of woodchucks in North America. The *common ground hog* of the Eastern states and Canada is typical of the group. It is about fifteen to eighteen inches long, and has long, coarse fur, which is

blackish or grayish above and chestnut-red below. Its legs are short and thick, and its tail is bushy. It has a broad, flat head and long whiskers.

The woodchuck usually makes its home on the edge of a sparsely wooded place. It digs its burrow so that it has several compartments, or "rooms." When the woodchuck burrows, it digs the dirt with its front paws, which have sharp claws, and scrapes the dirt out with its hind feet.

The woodchuck is a pest when it lives near farms. Such crops as red clover, alfalfa, and early garden vegetables are among its favorite foods. The animal also carries the ticks and fleas which spread spotted fever and plague.

When the woodchuck leaves home to look for food, it first squats on its haunches before the entrance to its burrow and takes a survey of the neighborhood. It looks and listens in all directions for any sign of danger. If the way is clear it then bounds off to the field or garden. Woodchucks do not lay up stores of food for winter, but they eat tremendous amounts toward the end of summer. This extra food in their bodies produces fat which keeps them nourished during their winter's sleep.

One species of woodchuck in the Western States is so injurious to crops that the Fish and Wildlife Service of the Department of the Interior is trying to control it through the use of poison gas. In Washington, 15,000 of these woodchucks were killed in one area of ten square miles. Most woodchucks have no economic value. Their flesh does not have a good flavor, and their hair is too coarse to make good furs.

S.P.Y.

See also GROUND-HOG DAY.



World Wide

He Sees His Shadow. But the woodchuck, popularly called the ground hog, is not a dependable weather forecaster.

Classification. The American woodchuck embraces three distinct groups and belongs to the ground squirrel family known as *Sciuridae*. The common woodchuck is *Marmota monax*.

WOODCOCK is the name of a group of birds in the snipe family. These birds live in moist woods and sheltered bogs in many parts of the world. The *American woodcock* lives in the eastern United States and southern Canada. It is about eleven inches long, and has a heavy body. It has short legs and tail, and a long bill which is very sensitive at the tip. The woodcock uses its bill to search for earthworms in the mud. It leaves little groups of holes in the ground where it has pulled out worms.

In winter the American woodcock flies to regions south of Missouri and New Jersey, and southward to the Gulf Coast. It comes north again early in the spring, appearing by the first of March. The bird makes its nest of dry leaves on the ground in the woods. The female lays four tannish eggs with reddish-brown markings. The bird's feathers are wood brown in color and have black bars. These colors make the bird blend with its background in the thickets and help protect it from its enemies.

The bird performs a weird courtship flight in the late evenings or on moonlight nights. It has also been known to carry away its young one by one from the nest. It carries them firmly between its thighs as it flies. A.M.B.A.

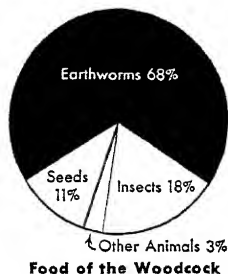
See also BIRD (color plate, Game Birds).

Classification. Woodcocks belong to the family *Scolopacidae*. The American woodcock is *Philohela minor*.

WOODCRAFT LEAGUE OF AMERICA. In 1901, Ernest Thompson Seton, the famous Canadian nature writer, organized the Woodcraft League of America. Since then the organization has spread throughout many parts of the world. The League's training center is the College of Indian Wisdom, situated on Seton's 2,500-acre tract at Santa Fe, N.M. The center offers leadership training to Woodcraft members as well as to members of other recreational organizations. See also SETON, ERNEST THOMPSON.

WOODCUT. A woodcut is a block of wood with a picture, design, or letters cut or engraved on the surface. Prints can be made from a woodcut, and the term also means such a print. Turkish boxwood makes the best woodcuts, since it is the hardest known variety of wood. The engraver draws or photographs on the block of wood the design which is to be reproduced. Then he cuts away the background with special tools, known as *gravers*. The design is left raised, or in *relief*. When ink is applied to the raised design, a print can be taken from it.

Woodcut printing is one of the oldest known methods of printing. The Chinese originated it about A.D. 593. Europeans started to print with woodcuts after they became acquainted with paper, but without knowing that the Chinese also used the process. The earliest known woodcut print made in Europe dates from about 1423.



For commercial work, the woodcut process has been almost entirely replaced by cheaper and quicker methods of reproducing illustrations. But many artists still make very beautiful woodcut prints. s.w.h.

See also DÜRER, ALBRECHT; ENGRAVING (Wood Engraving); HOBBY (Books about Hobbies [Block Printing and Woodcuts]).

WOOD DUCK. This beautiful duck lives in the woods of southern Canada and throughout the United States. The male is the most colorful of North American ducks. Its upper feathers glitter with green, blue, and purple. Underneath, it is red, yellow, and white. Females are brown above and yellowish below. Both males and females have large crests on the head. The birds are about twenty inches long with short necks and fairly long tails.

The wood duck spends much of its time in ponds and streams near woods. It also makes trips into the woods for nuts and insects. The nest is in a hollow tree, sometimes forty feet from the ground. It is usually in the woods, often away from the water. The female lays eight to fifteen creamy-white eggs.

Wood ducks at one time almost died out. Now they seem to be increasing in number. J.J.H.

See also BIRD (color plate, Wild Ducks); DUCK.

Classification. The wood duck belongs to the family *Anatidae*. Its scientific name is *Aix sponsa*.

WOOD ENGRAVING. See ENGRAVING (Wood Engraving).

WOODEN HORSE. The Greeks finally won the Trojan War by making a huge wooden horse, according to Greek mythology. Helen had been kidnapped from her husband Menelaus by Paris. He took her to Troy, and the Greeks under Agamemnon went after them to get Helen back. This began the Trojan War, which went on for ten years. The Greeks began to think that they would never capture the city.

Ulysses thought of a trick that might succeed. The Greeks pretended to give up the fight for the city, and some of their ships sailed away. Then they built a huge horse out of wood, and said that it was supposed to be an offering to the goddess Athene (Minerva). But the inside of the wooden horse was filled with armed soldiers. The Greeks left the horse outside the walls of Troy and sailed away.

The Trojans were very happy. They opened the gates and went out to look at the wooden horse. They wanted to take it into the city, but they were afraid of it. A priest of Poseidon, whose name was Laocoön, warned them against Greek trickery. He threw his spear against the horse's side and it made a hollow sound. Then the people were about to destroy the horse. But a trembling man who seemed to be a prisoner was dragged before them. He was a Greek named Sinon and he said that the horse had been meant as an offering to Athene. It had been made large in order that the Trojans could not take it inside the city. This remark made the Trojans want to take it in at once.

Suddenly two serpents appeared from the sea. They seized Laocoön and his two sons and killed them. The people believed that this was a sign of Athene's anger at Laocoön. They took the horse inside the city with much joy and celebration, after removing part of the wall so that they could get the horse through.

That night Sinon let the Greeks out of the horse, and they opened the gates to the other Greeks, who had returned. The city was set afire and the people killed. This event ended the Trojan War.

The proverb *beware of Greeks bearing gifts* comes from this story.

See also LAOCOÖN; ULYSSES.

WOOD FERN. See FERN (illustration; Classification).

WOOD FROG. See FROG (Kinds of Frogs).

WOOD GATHERER. See CAMP FIRE GIRLS.

WOODHEDGE. See ARCHAEOLOGY (Interpreting the Materials).

WOODMEN OF AMERICA, MODERN. This fraternal benefit society was founded at Lyons, Iowa, on January 5, 1883. The organization has a membership of about 406,000. All members are eligible for the many benefits of the society. The families of deceased members have received more than \$700,000,000 in insurance benefits. The organization operates a sanatorium, in Colorado Springs, Colo., for the treatment of members who have tuberculosis. The organization has headquarters at Rock Island, Ill.

WOODMEN OF THE WORLD is the name of a fraternal life insurance company. It was founded in Denver, Colo., in 1890. The organization carries on its activities in California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

Only white men and women between the ages of sixteen and sixty may become members of the organization. They must be in good health and also of good character. White children are admitted to the Junior Department.

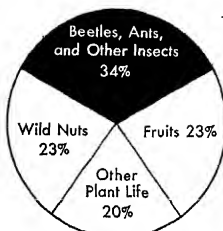
Since 1890 the Woodmen have paid out more than \$101,000,000 in insurance benefits. Many local branches throughout the West have given insurance protection to thousands of families. The organization has headquarters at Denver, Colo.

WOOD NYMPH, nymf. See BUTTERFLY (Kinds of Butterflies); INSECT (color plate, Butterflies [Common Wood Nymph]).

WOOD NYMPH, in mythology. See DRYAD.

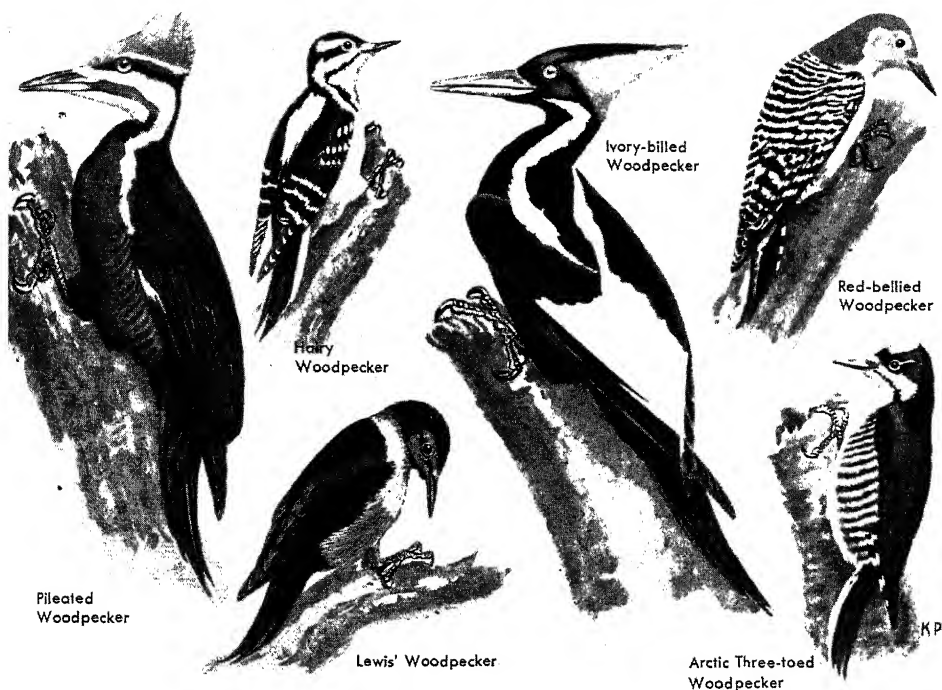
WOODPECKER. This bird uses its strong, chisel-like bill to bore holes in trees in search of insects. Woodpeckers live in all parts of the world except Australia and Madagascar. The toes of most woodpeckers are so arranged that the birds can cling to the side of trees and branches, and climb up and down the trunks. Two of

these toes are pointed forward and two are pointed backward. The tail feathers are stiff, and the bird can use its tail as a support while it clings to the tree trunk. Woodpeckers have long tongues, usually with barbed, horny tips. These tongues can be thrust out to spear the insect and draw it out of its hiding place in the wood. The



Food of the Redheaded Woodpecker

tongues of woodpeckers are coated with sticky saliva which helps them gather up small insects such as ants. The birds also eat berries, fruits, and nuts.



Some Members of the Woodpecker Family

Woodpeckers have harsh voices. Their mating call is a rapid drumming, which is done by striking the bill on a dead limb or other resounding surface. Their feathers are usually barred or spotted black and white, or brown and black. The male may have red or yellow markings on the head.

The birds make holes in the trunks of trees for their nests, and leave fine chips of wood on the bottom to cushion the eggs. The young are hatched naked. Woodpeckers spend most of their time alone, except in the fall, when families roam the woods together. The sapsucker is the only woodpecker that is sometimes harmful to trees. Usually woodpeckers are helpful.

One of the woodpeckers, called the *ivory-billed woodpecker*, is the rarest bird in North America. It is a large, wild, and shy bird with a high, scarlet crest. It lives in the virgin forests of the Southern States. The *pileated woodpecker* is another North American bird. It is somewhat smaller than the ivory-billed, but lives in more places and is still common in the forests. The *yellow-bellied sapsucker* and the *flicker*, which is often seen around buildings eating ants on the ground, are also North American woodpeckers. The *redheaded woodpecker* has striking red, white, and bluish-black feathers. The *hairy woodpecker* and the *downy woodpecker* both live throughout the year in the Northern States and Canada. The small downy woodpecker is the most common woodpecker.

The green woodpecker is a brightly colored bird of

Europe. The great-spotted woodpecker is a handsome bird resembling the hairy woodpecker that lives in Europe and Asia Minor. The ground woodpecker lives in South Africa. It feeds on the ground and digs its nest in clay banks.

A.A.A.

See also BIRD (color plate, Birds That Help Protect Our Trees); FLICKER; SAPSUCKER; WRYNECK.

Classification. Woodpeckers make up the family *Picidae*. The ivory-billed is *Campephilus principalis*, the pileated is *Phloeotomus pileatus*, the redheaded is *Melanerpes erythrocephalus*, the hairy is *Dryobates villosus*, and the downy is *Dryobates pubescens*.

WOOD PEWEE. This small bird belongs to the flycatcher family. It nests in the summer in Canada and the eastern United States, and spends the winters in Central and South America. The wood pewee looks somewhat like the phoebe, but it is a grayer brown and has white bars on its wings. Its call is plaintive, and sounds somewhat like *pee a wee*. The pewee sings at the first sign of daybreak and also for a while in the late evening when the shadows begin to fall.

The wood pewee builds one of the daintiest of nests, weaving various plant fibers together tightly and covering the outside with lichens. The bird places its nest on a horizontal limb of a tree. The female lays two to four eggs, colored a creamy white and speckled with brown. The wood pewee is useful, for it eats many insects. A.A.A.

Classification. The wood pewee belongs to the *Tyrannidae* family. It is classed as *Myiochanes virens*. It is

WOOD PULP



Olin Sewall Pettingill, Jr.

The Wood Pewee's Slow and Plaintive Notes are heard at daybreak and at twilight.

sometimes called the Eastern pewee. The Western pewee resembles it in appearance but has a different song.

WOOD PULP. See CELLULOSE (illustration, How Cellulose Is Made); PAPER; WOOD.

WOODS, GRANVILLE T. (1856-1910). See NEGRO (Negro Contributions to American Life [Science and Invention]).

WOODS, LAKE OF THE. See MINNESOTA (Rivers, Waterfalls, and Lakes).

WOODS INDIAN, another name for an Indian of the eastern woodlands. See INDIAN, AMERICAN (Eastern Woodsmen; color plate, Eastern Woodsmen).

WOOD'S METAL. See ALLOY (How Alloys Are Made; illustration).

WOOD SORREL, SAHR *el*, is a small spring wild flower of eastern North America. Wood sorrels also grow in Europe, Asia, and Africa. There are several kinds with dainty white or tinted flowers. The leaves have three leaflets, and may be the original shamrock of legend. The three leaflets of the wood sorrel also make it resemble clover. The plants are sometimes grown in gardens or pots. See also OXALIS; SORREL. T.J.

Classification. Wood sorrels belong to *Oxalis* and related genera in the family *Oxalidaceae*. The white or true wood sorrel is *O. acetosella*.

WOOD SPIRIT. See WOOD ALCOHOL.

WOOD THRUSH. See BIRD (color plate, Common American Songbirds); THRUSH.

WOODWARD, CALVIN MILTON (1837-1914). See MISSOURI (Education).

WOODWARD, WILLIAM E. (1874-), is an American writer. His books include novels, as well as biography and history written in a popular style. He was born in Lexington County, South Carolina, and studied at the South Carolina Military Academy (now The Citadel). He became a successful reporter and advertising writer, and did not turn his attention to literature until 1920. In his first novel, *Bunk*, he invented the word "debunk," which has since become a part of the American language. L.J.

His Works include *Lottery*, a novel; and the biographies *George Washington*, *Meet General Grant*, and *Lafayette*.

WOOD-WIND INSTRUMENT. See MUSICAL INSTRUMENT; ORCHESTRA.

WOODWORKERS OF AMERICA. See CARPENTERS AND JOINERS OF AMERICA, UNITED BROTHERHOOD OF.

WOODWORKING

WOODWORKING. The making of useful and decorative articles from wood is one of the oldest crafts, and is one of our most important industries today. Woodworking is generally defined as the forming and shaping of wood for the outside and inside of homes, buildings, churches, and other structures, and the making of furniture, cabinets, shelves, and other articles. The building of the framework of a wooden home or building is done by a woodworker who is commonly called a carpenter. (See CARPENTRY.) The hand carving of musical instruments, statues, and other fine objects is called wood carving. See WOOD CARVING.

Woodworking today is part of several important industries. In the building industry, woodworkers known as finishers put the finishing touches to the inside and outside of houses. Interiors call for the most skillful woodwork, involving the installation of panels and moldings, stairways, door and window frames, fancy partitions, built-in cabinets, and similar work. Woodworkers employed in factories make many of the things which carpenters can install complete such as doors and window frames, sills, and sometimes large parts of the building structure itself. The furniture industry uses highly skilled woodworkers for the making of all types of home and office furnishings. Many metalworking industries also employ woodworkers, known as pattern-makers, who make wood patterns from which cast iron, steel, brass, bronze, and aluminum castings are made. The automobile industry also uses some woodworkers.

Woodworking also is one of the most popular of home crafts, or hobbies. Millions of men and boys, and quite a number of women, have equipped woodworking shops in their homes, and find pleasure and relaxation in making things in their spare time. Woodworking appeals to persons of all ages and inclinations because of the great number of things that can be made of wood.

Woodworking as a Hobby

The thing made by the hobbyist may be simple enough for a small boy to make, or so difficult that it taxes the skill and ingenuity of the most experienced workman.

One great reason for the popularity of amateur wood-



Ewing Galloway

A Woodworking Student turns a chair leg on the lathe. Chisel-like tools are used to cut the spinning piece of wood.

working is the extremely wide range of projects the woodworker may choose from, even if he does not possess many tools. Many simple, useful things — such as garden furniture, birdhouses, and rough shelves — may be built with nothing more than a hammer and saw. At the other extreme is the completely equipped shop whose owner has invested hundreds of dollars in his hobby.

There are a number of monthly publications devoted entirely to home woodworking and other crafts. Other publications have departments carrying plans and designs for woodworking projects. These are very helpful for both the beginner and the advanced craftsman. Plans may also be obtained from many other sources, such as the manufacturers of woodworking tools, shop equipment, and plain and fancy lumber.

Care of Tools. Both hand and machine woodworking tools such as the lathe are described in the article *WOODWORKING TOOL*. As that article points out, these tools may range from a few primary ones to elaborate and complete sets. But the best tools will give poor service and results unless they are cared for. The amateur woodworker should provide a box or wall rack where tools may be kept. Otherwise tools are likely to be mislaid and lost, or put in places where the cutting edges are nicked and dulled or become rusty.

Tools must be kept sharp. It is far easier to do a workmanlike job with a sharp tool than with a dull one. If a little light machine oil is wiped on the metal parts from time to time, rust caused by perspiration of the hands or damp air will not form.

Kinds of Wood to Use. Almost all boxes and ordinary wood scraps are softwood which can be sawed, planed, chiseled, or drilled easily. The most common softwood — and one of the best — is white pine. Most lumberyards stock it. Clear white pine is more expensive, but is the best for woodworking purposes. It should be used for the better projects such as cabinets, small tables, and similar pieces. Cypress also works well, and is usually easy to get. California redwood is an excellent long-lasting wood that is ideal for birdhouses, lawn furniture, or similar articles that will be exposed to the weather. Basswood is another favorite with woodworkers. Gumwood is a hardwood, but it is easy to work and takes a fine finish.

Of the hardwoods, oak is the cheapest, most available, and easiest to work. It is also easy to finish. It takes stain, varnish, and wax well, and does not show up slight defects through a polished surface as many of the more expensive hardwoods do. Walnut, maple, birch, and mahogany are other woods the craftsman will have occasion to use as he becomes more skilled. These woods are often used in fine furniture and cabinetmaking, and require very exact workmanship.

Plans and Measurements. In any woodworking project, it is best to make a plan or working drawing of the article to be made. With such a drawing you can see at once if proportions and dimensions are correct and, if not, they should be changed. The drawing is also helpful in selection of wood sizes.

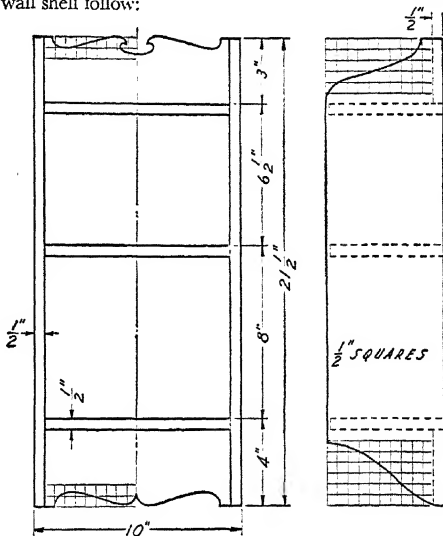
Unless you lay out a piece of work accurately, you will not be able to turn out a satisfactory job because the pieces will not fit together. Use a rule and a square

and check all measurements as you go along. Mark lines on the wood with a very sharp, hard pencil, or better yet, with a knife. Check all surfaces and edges with the try square to make certain they are true after sawing or planing.

Types of Projects. There are simple projects that can be made in an evening. Others require hundreds of hours to complete. The beginner should start with things that test his ability to use his tools: to saw along a line, plane a smooth, flat surface, or use a chisel in making a simple joint. Among the easiest projects are small shelves, towel and necktie racks, stands to hold plants, and similar objects. As the craftsman's skill with tools increases, he may undertake more difficult projects, such as a taboret, a footstool, an extension book rack, or a bench.

A Woodworking Project

The materials and method of construction for a small wall shelf follow:



A Small Wall Shelf. The materials needed and steps in construction are described in the article "Woodworking."

Materials (All white pine)

- 2 pieces $\frac{3}{8}$ " \times $5\frac{1}{2}$ " \times $21\frac{1}{2}$ " —sides
- 3 pieces $\frac{3}{8}$ " \times $5\frac{1}{2}$ " \times 9" —shelves
- 1 piece $\frac{3}{8}$ " \times 3" \times 9" —top piece
- 1 piece $\frac{1}{2}$ " \times $3\frac{1}{2}$ " \times 9" —bottom piece

Directions

- (1) Saw and plane the pieces to exact sizes.
- (2) Smooth pieces with sandpaper.
- (3) Assemble parts as shown in the diagram, using 6-penny finish nails. Drive nails below surface of wood with nail set and fill holes with plastic wood.
- (4) Sandpaper assembled shelf with fine sandpaper.
- (5) Paint with primer paint and allow to dry for 24 hours.
- (6) Smooth primer by again sandpapering lightly.
- (7) Apply enamel and allow to dry for 48 hours, then apply second coat.
- (8) Remove any roughness with fine sandpaper, fine steel wool, or pumice stone and oil.

History of Woodworking

The woodworker evidently has been a respected man in the community from the earliest times. The royal axman of ancient Egypt held a very important post, because he had charge of all the builders. It is claimed that while ordinary workers of the king were paid in barley, the woodworkers were paid in silver. The tomb of Tutankhamen, twelfth ruler of the eighteenth Egyptian dynasty, who lived about 1370-1352 B.C., contained hundreds of artistic pieces made by woodworkers.

As man improved the tools with which he worked, homes, palaces, churches, and temples became more stately and beautiful. The churches still in existence in Europe show how expert the workman had become. Much of the interior was of wood, and this gave the woodworker a real opportunity to show how good a craftsman he was. The furniture also was made of wood, and the best type of workmanship is displayed.

The beautifully carved statues, crosses, pulpits, and choir stalls found in the monasteries, convents, churches, basilicas, and cathedrals erected in Europe during the Middle Ages show how expert woodworkers had become in the use of their tools.

The value of wood for these purposes is shown by the fact that parts of dwellings, temples, pieces of furniture, tool handles and the like made of wood hundreds and thousands of years ago are still in existence. Those who love wood and work with wood have every reason to be very proud of their choice. J.J.M.

See also **HOBBY** (Books about Hobbies).

WOODWORKING TOOL. The family of woodworking tools is very large. It has been growing ever since primitive man began to look at every stone or shell to see whether he could use it for cutting, splitting, scraping, piercing, or shaping pieces of wood.

Some of the woodworking tools that have been found in caves and graves date back as far as 1,000,000 to 3,000,000 years before Christ. This early period is commonly known as the Old Stone Age. The tools made at that time were chipped or flaked pieces of flint made much as our Indians made their stone arrowheads, knives, spearheads, and tomahawks.

Later, New Stone Age man learned how to use one stone to grind a softer stone so as to produce a tool which worked better and looked better than those of the Old Stone Age.

Our museums still have many tools which date from these early periods. They are very clumsy, but we must not forget that the men who produced them were the first designers of tools. They made it possible for those who came after them to make improvements until man had passed through the Bronze Age and the Iron Age, and arrived at the excellent tools which we who live in the Steel Age now use.

Modern Power Woodworking Tools

When we stand before the large power machinery in the mill room of a factory, it is difficult for us to imagine that these swiftly moving machines are merely improvements made on the crude woodworking tools produced by our ancestors thousands of years ago. Yet these marvelous machines perform the same operations as did those old clumsy stone tools, except that they do it much

more perfectly and hundreds of times more quickly.

The Circular Saw is one of the most useful of all of the woodworking machines. The first one of these was invented in England in 1777. It consists of a table mounted on a base through which the circular disklike saw blade projects. The saw is mounted on a shaft which is usually driven by a motor. The table is equipped with a steel cutoff gauge against which the wood must be held for crosscutting. There also is a ripping fence which is used for ripping, or cutting the wood lengthwise with the grain.

The Band Saw is another very useful tool. This tool was invented in England in 1808. The band saw consists of a thin, narrow, flexible, endless piece of steel into which saw teeth have been cut. This saw is mounted on the rims of two rubber-covered pulleys, mounted one above the other. The lower of these pulleys is revolved by a motor. This causes the band saw to run at a great speed between one set of guides set above the cutting table and another set of guides beneath the table. Large heavy band-saw blades are used for cutting logs into boards, and the thin narrow band saws are used for sawing furniture and ornamental work.

The Jig Saw may be looked upon as being a little brother of the band saw. It uses much finer blades, and can be used for cutting out delicate work.

The Jointer is a much-used machine which was invented in England in 1793. The wood that is to be planed rests on a table in the center of which a cutter-head revolves with great speed. The table can be raised and lowered so that the thickness of the shaving can be varied to suit the kind of lumber to be planed.

The Planer does the same type of work as the jointer, but is a much heavier machine. It feeds the wood against a cutter mechanically, and it can be used only to plane lumber to a uniform thickness.

The Wood-turning Lathe was invented, ages ago. It consists of a bed, a headstock, a tailstock, and a tool rest. On a lathe, the work revolves against tools operated by hand. Many beautiful pieces of work can be produced on this wonderful machine tool.

The lathe headstock is usually driven by motor. It carries the *live center* which causes the work mounted upon it to revolve. The other end of the work is supported by and revolves upon the *dead center* in the tail stock. The shaping of the stock is done by the tools in the hands of the turner, who moves the tools back and forth upon the tool rest.

The machine tools described so far are those most commonly used by the woodworker. There are many others such as the shaper, mortiser, router, drill press and sander. But the beginner can easily learn more about these other machines after having studied the action and uses of the circular saw, the band saw, the jig saw, the jointer, the planer, and the wood-turning lathe.

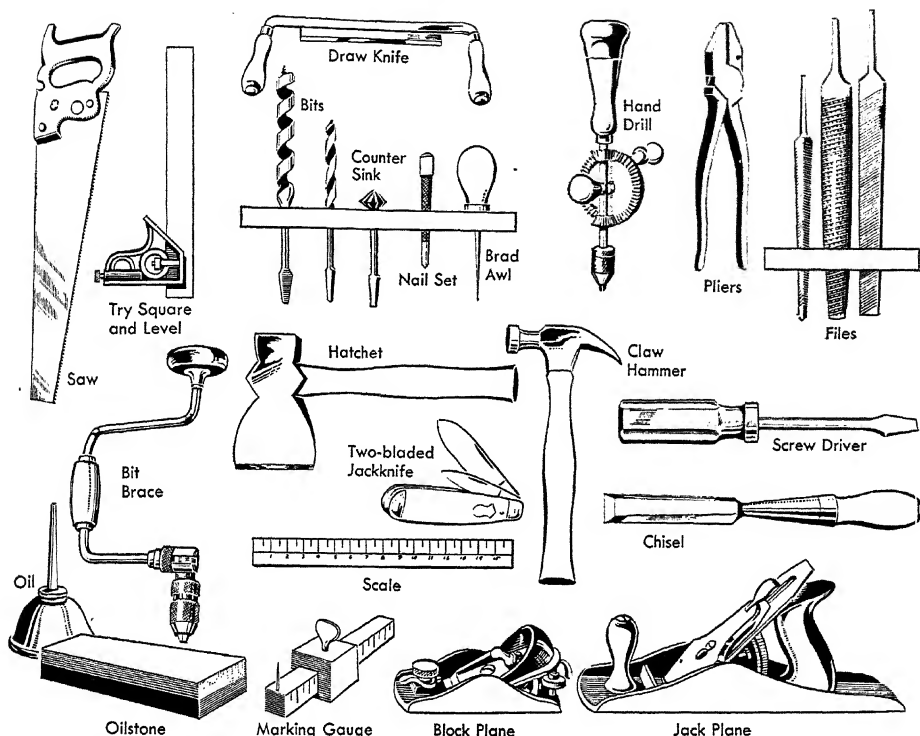
All power machines used by the woodworker are very dangerous, and any one using them should carefully study the safety rules which usually are explained in the instruction books furnished by the manufacturer.

Hand Woodworking Tools

The hand tools used by the woodworker are quite

WOODWORKING TOOL

WOODWORKING TOOL



Some of the Common Woodworking Tools Used in the Home Workshop

generally known. The accompanying illustration shows some of them. The hobbyist who is just starting to equip his home workshop should look around the home. He will usually find there a number of tools that can be easily cleaned up, sharpened, and put into working condition again. With a hammer, a saw, a plane, a screwdriver, a chisel or two, and an ax, the early settlers of our country did some wonderful things. The homemaker likewise can start with just such a collection and then add more tools as the need for them arises during his projects.

Other Power Tools. When buying tools, it is well to remember that there are usually three kinds from which to choose—the very cheap, the very expensive, and those that can be bought at a price somewhere between the cheap and the high-priced. Some of the cheaper tools may just be satisfactory. Most of them are not. The very high-priced tools are for the mechanic who must get years of use out of them. The medium-priced tools will be found satisfactory for the home workshop, and the beginner will do well to purchase this type until his work becomes more advanced.

The following list will give the homemaker some idea of what tools he will need as he advances from the beginner stage to the point where he will be an object of envy to his friends. These tools should be purchased as the need for them arises.

Hand Tools

- | | |
|--|---|
| 1 16-ounce claw hammer | 1 $\frac{1}{2}$ -inch wood chisel |
| 1 22-inch, 10-point crosscut saw | 1 1-inch wood chisel |
| 1 24-inch, 6 $\frac{1}{2}$ -point rip saw | 1 6-inch extra-thin tapered triangular file |
| 1 coping saw with one dozen blades | 1 6-inch slim tapered file |
| 1 14-inch iron jack plane | 1 10-inch rattail file |
| 1 block plane | 1 10-inch flat mill file |
| 1 combination miter and try square | 1 10-inch half-round bastard file |
| 1 6-foot folding rule | 1 12-inch half-round wood rasp |
| 1 12-inch, 8-point compass saw | 1 auger-bit file |
| 1 marking gauge | 4 interchangeable file handles |
| 1 10-inch, T bevel | 1 28-inch spirit level |
| 1 set of auger bits from $\frac{1}{2}$ inch to 1 inch | 1 glass cutter |
| 1 10-inch sweep bit brace | 1 putty knife |
| 1 hand drill | 1 18-inch wrecking bar |
| 1 rose countersink | 1 8-inch adjustable wrench |
| 1 spokeshave | 1 14-inch pipe wrench |
| 1 set of twist drill bits $\frac{1}{8}$ to $\frac{1}{2}$ inch by 64ths | 1 8-inch steel wing divider |
| 1 4-inch screw driver | 1 scratch awl |
| 1 6-inch screw driver | 1 cabinet scraper |
| 1 8-inch screw driver | 1 2-by-8-inch combination carborundum stone |
| 1 10-inch screw driver | 1 24-by-16-inch steel square |
| 3 assorted nail sets | 4 8-inch C clamps |
| 1 $\frac{1}{2}$ -inch wood chisel | 4 6-inch C clamps |
| 1 $\frac{3}{4}$ -inch wood chisel | 1 woodworker's bench vise |

WOODY NIGHTSHADE. See BITTERSWEET.

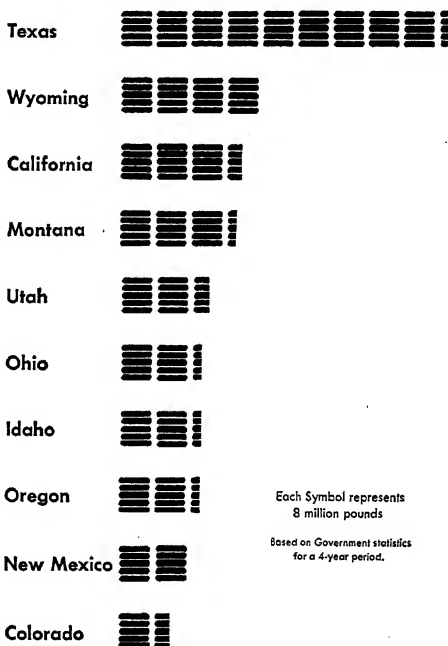
WOOF, or WEFT. See CLOTH; WEAVING.

WOOL. People wear clothing made from wool to keep them warm in winter and cool in summer. Wool is a natural insulator and protects the body from outside changes in temperature. Wool is comfortable, too, because it gives warmth without weight and absorbs moisture without feeling wet to the skin.

Kinds of Wool. Nearly all the wool cloth we buy is made from the warm fleecy hair which covers the bodies of domestic sheep. Special kinds of wool are made from the hair of certain breeds of goats and animals of the camel family. Wool differs from ordinary hair in that it has many tiny scales on its surface. These scales overlap each other like the shingles on a roof. They hold wool fibers firmly together when they are spun into yarn. They also give the fiber a curl, or crimp, which in turn gives it natural resilience. The structure of wool gives it good felting properties. That is, the fibers will interlock and mat together under pressure, heat, and moisture.

Different kinds of sheep have varying qualities and amounts of wool. Merino sheep have the finest and largest amount of wool. A merino ram will yield as much as twenty-eight pounds of wool at a shearing. This is enough wool to make about eight men's suits, as the average man's suit uses up about three and one-half pounds of raw wool. A man's coat uses about five pounds of wool. A woman's coat takes about four pounds and a woman's suit about three pounds.

Ten Leading Wool States



PICTOGRAPH CORPORATION

Of all the different kinds of wool used to make clothing, sheep's wool is the most important, because sheep are raised in nearly all parts of the world. Other wool-bearing animals are raised only in certain regions of the world. Among these animals are the camel from Mexico, Africa, and Asia; the alpaca of South America; the angora goat of Asia Minor, which gives us mohair; the cashmere goat of Tibet and Northern India, whose fiber is made into soft, shiny cashmere woolsens and shawls; the llama, of South America, which produces a type of camel's hair, and the vicuña of the Andes in Peru, which gives us the rarest and softest wool, vicuña.

Qualities and Grades of Sheep's Wool. Most of the wool we buy is sheared from the live animal. The shearing from a full-grown sheep is called a *fleece*. *Lamb's wool* is the first shearing of a young sheep, taken when the lamb is eight to twelve months old. Wool from lambs twelve to fourteen months old is called *hogg*, or *hogget*. It is very soft and fine and sells at a high price. *Pulled wool* is removed from the pelts of slaughtered sheep. Pulled wool is not so desirable as good fleece wool.

Wool varies greatly with different breeds of sheep (see SHEEP [Breeds of Domestic Sheep]). The health of the animals, the climate, the location of the farm or ranch, and the care given the animals are also important in the quality and length of wool. Neglect and poor feeding cause uneven, coarse wool. The fibers are weak in places and have little elasticity. In healthy sheep, wool is covered with a greasy film, called *yolk*, or *suint*. This film protects the scales, keeps the fibers soft and pliable, and helps to prevent tangling.

The most important points to consider in commercial judging of wool are the condition, the quality, the strength and length of fiber, and the color. By *condition*, wool buyers mean the amount of dirt and grease in the wool as it comes to market. *Quality* is the trade term for fineness, strength, and length of fiber. The wool from purebred Merinos has the highest quality of all sheep's wool fibers. But Merino wool is sometimes shorter than desired. Longer fibers of high quality have been obtained by crossing Merinos with longer-wooled breeds. Pure white is the most desirable color.

For consumer uses, wool is classified according to the Wool Products Labeling Act of 1939, as wool, reprocessed wool, and reused wool. The term *wool* means new, or virgin, wool. *Reprocessed wool* is wool which has been made into merchandise but was never used by the consumer. It may also be wool which has gone through a manufacturing process, but again been reduced to a fibrous state and remade into some other wool product. *Reused wool* is wool which has been made up and used by the consumer and then reduced to a fibrous state and made up into merchandise.

Commercial Classifications. For classifying wool as to *fineness*, or diameter of fiber, two systems are used: the blood, or American, system and the numerical, or English, system. The following table shows the grades of fineness under both systems. The English system, used in most countries, shows the number of combed fibers per inch.

American System
Fine

English System
80's
70's

WOOL



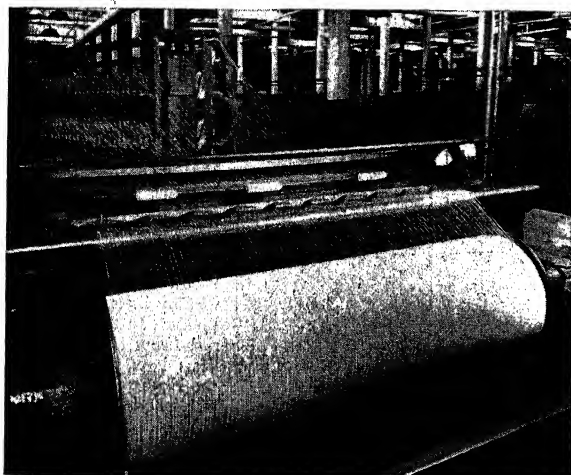
A Sheep's Heavy Coat of Wool is sheared by an expert worker on one of the great ranches of the western United States.



In the Woolen Mill the fleeces are sorted and torn apart. Next they will be thoroughly washed and the fibers sorted.



Worsted Wool is Drawn on Machines. At this stage the wool is called "slivers." Drawing straightens the long fibers.



Warping the Worsted Wool. In this process the machine draws the wool from bobbins and winds it around a cylinder to form the warp, or web.



Wool is Woven into Cloth on large looms. Dyeing and finishing processes follow.

Photos: Office of Indian Affairs; Ewing Galloway

	64's
Half-Blood	60's
	58's
Three-eighths Blood	56's
Quarter Blood	50's
	48's
Low-Quarter Blood	46's
Common	44's
Braid	40's
	36's

The length of the wool fiber is stated by the terms *combing*, *French combing*, and *clothing*. While there is no official standard for specific lengths, it is commonly accepted that combing wools are over two inches long. French combing fibers are about one and one-fourth to two inches long, and clothing wools are less than one and one-fourth inches long.

There are two classes of wool fabrics, *worsted*s and *woolens*. In worsted yarns, the fibers are made to lie parallel to each other and then are tightly spun into a firm, smooth yarn. In woolen yarns, the fibers lie in all directions, resulting in a soft, fuzzy yarn. Woolens and worsteds are two distinct types of woolen fabrics. When well made, each will give satisfactory service.

Shearing and Manufacture. Ordinarily, sheep are sheared once a year, but in hot countries there may be two shearings. In the United States, the big shearing months are April and May. Hand clippers are still used on small farms. But on large ranches the work is done with power-driven machinery. As far as possible, the fleeces are removed in one piece. Sometimes the wool is washed before shipment. But usually just the dirtiest and coarsest parts are cut off in a process called *skirting*. Then the fleeces are rolled up, tied, packed in bales, and sent to the mill for sorting and scouring.

Not only do fleeces from different sheep vary, but wool from the same sheep is not all of the same grade. The best comes from the shoulders and sides. The wool grows coarser and less desirable the farther back and the lower it follows the line of the body. The sorter starts at the edges of the fleece and works toward the center, placing the wool in different piles as he tears it out. He also picks out any pieces of refuse that can be easily removed. Scouring is necessary to cleanse the fleece thoroughly of dirt and grease. The wool is passed through three or four vats containing warm water and soap. The vat is stirred by automatic rakes. In some of the larger mills, chemicals are used for scouring.

Wool is ready for dyeing after it is dried. Then it goes through a blending process. Various qualities or colors are obtained by mixing different fibers. The wool is oiled to restore its natural pliancy, and is run through a series of carding machines. In the *carding* process, the wool passes through rows of teeth, which straighten and interblend the fibers into a flat band. The drawing machine reduces the band to a soft, loose cord called *roving*, which is a little larger than heavy crocheting yarn. After being wound on spools, the cord is taken to the spinning room to be spun into yarn. A special process of combing long fibers, to make them lie in parallel rows, is necessary in the preparation of yarn for worsteds.

Great Britain and the United States lead in the manufacture of wool products. The greatest wool-product states in the United States are Massachusetts and Penn-

sylvania. Most of the sheep which produce our wool are raised in Western states. Then this wool is shipped to the great markets of the East. The wool market at Boston is greater than in any other city of the United States.

L.A.H.

Related Subjects. The reader is referred to the bibliography with the article TEXTILE, and also to the following:

MATERIALS OF WOOL

Baize	Crepe	Poplin
Broadcloth	Duvetyn	Serge
Bunting	Felt	Shoddy
Cashmere	Flannel	Tweed
Challis	Gabardine	Velour
Chenille	Kersey	Woolen
Cheviot	Linsey-Woolsey	Worsted
Covert	Mohair	

UNCLASSIFIED

Alpaca	Latin America (color plate,
Cashmere Goat	Carding Wool in Ecuador)
Clothing	Llama
Dyes and Dyeing	Vicuña
Fiber	Weaving
Lanolin	

Outline

- I. Introduction
- II. Kinds of Wool
- III. Qualities and Grades of Sheep's Wool
- IV. Commercial Classifications
- V. Shearing and Manufacture

Questions

How is wool different from ordinary hair? What makes wool fibers hold firmly together in yarn?

What kind of sheep gives the most wool? The best wool?

From what animals besides sheep do we get wool?

How often are sheep usually sheared?

From what part of the sheep does the best wool come?

WOOLEN is a fuzzy yarn spun from short lengths of carded wool. It is used to make blankets and woolen cloths. Woolen cloths usually are woven with a diagonal, raised line, or *twill*. But the fuzzy surface, or *nab*, hides the twill. Melton is a twill-weave wool fabric. All cloth made of wool is not woolen. See also WORSTED. G.G.D.

WOOLF, VIRGINIA (1882-1941), was an English



Harcourt, Brace & Co.

Virginia Woolf wrote some of the most original of modern English novels.

novelist and essayist. Her novels were written in an experimental style which emphasized the thoughts of the characters. Many critics considered her one of the best novelists of her time, but some readers found her delicate prose difficult reading. Virginia Woolf was born into a wealthy literary family in London. In 1912 she married Leonard Woolf. Five years later they founded the Hogarth Press, which published the works of

young writers. Later Virginia Woolf began to publish her own work. She drowned herself in discouragement over poor health, and the tragedy of World War II. L.J.

Her Works include *Jacob's Room*; *To the Lighthouse*; *The Waves*; and *The Tears*.

WOOL FAT. See LANOLIN.

WOOLCOTT, ALEXANDER (1887-1943), was a well-known American journalist and tale-teller. He became



Acme

Alexander Woolcott, colorful American critic

perhaps even better known for his unusual personality than for his writings. George Kaufman and Moss Hart made Woolcott's oddities nationally known in the play *The Man Who Came to Dinner*, in which Woolcott played the part of himself. He was born in Phalanx, N.J., and was educated at Hamilton College. He became a newspaperman in New York City, where he made his first major success as a drama critic. Later he wrote books of essays, and from 1929 to 1940 made frequent radio broadcasts as "The Town Crier." On these programs he commented on books and plays and told many stories in a sentimental but dramatic fashion. L.J.

His Works include *Shouts and Murmurs*; *While Rome Burns*; and *The Woolcott Reader*.

WOOLLEY, MARY EMMA (1863-1947), was an American educator. She received numerous awards for her distinguished services in the fields of education and world peace. She was born in Norwalk, Conn., and was educated at Brown University. From 1900 until 1937 she served as president of Mount Holyoke College. In 1932 she was a delegate to the Disarmament Conference at Geneva, Switzerland. This was the first time a woman had represented the United States at a conference of this kind. E.V.E.N.



Mount Holyoke Press Service

Mary E. Woolley, leader in education and peace

WOOLLY BEAR, a caterpillar. See COCOON; MOTH (Kinds of Moths [Tiger Moth]).

WOOLLY MONKEY. See SOUTH AMERICA (animal map).

WOOLMAN, JOHN (1720-1772). See AMERICAN LITERATURE (History); NEW JERSEY (Arts and Crafts).

WOOL WAX, or FAT. See LANOLIN; WAX.

WOOLWORTH, FRANK WINFIELD (1852-1919), was an American merchant who founded the five-and-ten-cent store. He was born on a farm in Rodman, N.Y. At the age of nineteen he entered business as a clerk and worked out his plan for a store which would sell nothing but articles priced at five or ten cents. In 1878 he started his first store, but it was a failure. Woolworth tried again the following year, and this time the



Acme

Frank Woolworth, founder of the five-and-ten stores

business was a success. From this start the business expanded until at the time of his death he had more than 1,300 stores in the United States and Canada. In 1913 he built the Woolworth Building in New York City. For many years it was the tallest office building in the entire world. H.U.F.

WOONSOCKET, R.I. (population 49,303), is an important textile center and the third largest city in Rhode Island. The name

Woonsocket is the Indian word for *thunder mist*. It refers to the misty falls of the Blackstone River near the city.

Factories in Woonsocket make such products as woolen and worsted yarns and fabrics, rayon and nylon goods, rubber goods, textile machinery, and paper products.

Woonsocket was first settled in 1667. It was an agricultural community until 1810, when one of the first cotton mills in the United States was built here. Woonsocket was incorporated as a town in 1867, and as a city in 1888. W.G.R.

WOOSTER, COLLEGE OF, is a coeducational liberal arts school at Wooster, Ohio. It is controlled by the Presbyterian Church. The college is associated with the Ohio Agricultural Experiment Station at Wooster, the Wooster Little Theater group, and the Wooster Federation of Music. Wooster College was founded in 1866, and has an average enrollment of about 900.

WORCESTER, WOOSTER, Mass. (population 193,694), is one of the most important manufacturing centers in New England. The city lies in east-central Massachusetts, in a valley surrounded by low hills. Worcester is about forty-five miles west and south of Boston, and about fifty miles east and north of Springfield. The city covers an area of thirty-eight square miles. Along the east side of Worcester is Lake Quinsigamond.

Cultural Life. Worcester is the home of Holy Cross College, the oldest Catholic college in New England (established 1843); Worcester State Teachers College (established 1874); Worcester Polytechnic Institute (established 1868); and Assumption College (founded 1904). Museums include the Worcester Art Museum, the Worcester Natural History Society, the Worcester Historical Society, and the American Antiquarian Society.

Industry. The textile industry began here in 1837 with the invention of a new loom by William Crompton. In 1852 Russell Hawes of Worcester invented a machine for making envelopes which was the beginning of one of the largest envelope-manufacturing plants in the world. The making of wire and wire products was begun here shortly after the War between the States. Other products manufactured in Worcester include grinding wheels, machine tools, shoes, rugs, textiles and textile machinery, and Pullman coaches.

History. The site of Worcester was a camping ground

for the Nipmuck Indians until Daniel Gookins led a group of settlers here in 1674. The settlement was abandoned during Queen Anne's War (1702), but in 1713 Jonas Rice, one of the original settlers, returned. He was soon followed by several hundred other settlers. The settlement was incorporated as a town in 1780, and became the seat of government of Worcester County. In 1786 the courthouse was besieged by revolting farmers during Shay's Rebellion. In 1791 a Worcester court handed down a historic decision that Negroes were included in that part of the Constitution which said that "all men are created free and equal."

Worcester became an important manufacturing center during the 1800's, when steam power was developed and improved. The town was chartered as a city in 1848. W.F.D.

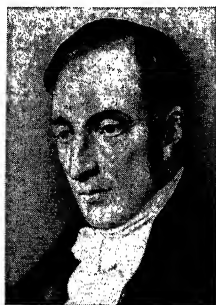
WORCESTER, JOSEPH EMERSON (1784-1865), was an American lexicographer, or compiler of dictionaries. Worcester was born in Bedford, N.H., and was educated at Yale University. He wrote a number of works on history and geography, and began working on dictionaries in 1828. His *Universal and Critical Dictionary* appeared in 1846. It was repeatedly enlarged until in 1860 it became his greatest work, *Worcester's Dictionary of the English Language*. This was the first illustrated English dictionary, and proved very popular. E.L.S.W.

WORCESTER POLYTECHNIC INSTITUTE is a privately controlled technical school for men at Worcester, Mass. It gives training in civil, electrical, chemical, and mechanical engineering, and in chemistry and physics. The Institute was founded in 1865, and has an average enrollment of about 650. J.W.H.

WORDBOOK. See DICTIONARY.

WORDS. See BASIC ENGLISH; DICTIONARY; SPELLING.

WORDSWORTH, WILLIAM (1770-1850), was one of the best-known of English poets. He is generally considered the first of the English Romantics. His poems in the *Lyrical Ballads* were a revolt against the artificial poetry of the Augustan age. Wordsworth believed that the finest poetry could be written in the simplest words. He chose commonplace subjects and characters and colored them with his imagination. In the humblest of lives he found an inner strength and dignity that proved to him the equality of man.



Brown Bros.
William Wordsworth, noted English Romantic poet

Lyrical Ballads. In 1798 Wordsworth and his friend Samuel Taylor Coleridge published *Lyrical Ballads*. This book marked the beginning of the Romantic era in England. In this collection the two poets produced two types of poetry. Coleridge wrote of magical and supernatural subjects in a realistic manner. Wordsworth wrote of everyday objects and incidents in an imaginative manner. Coleridge's contributions included the famous "The Rime of the Ancient Mariner." Wordsworth's poems included "We Are Seven," and "Lines on Tintern Abbey."

Wordsworth's poems are uneven in quality. In some, such as "Goody Blake" and "The Idiot Boy," he worked so hard for simplicity that he achieved only commonplace statements and dullness. But in poems such as "Ode on Intimations of Immortality" and "The Daffodils," he reached into the mind as well as the heart. After 1807 Wordsworth's powers began to decline and outside of his sonnets, he wrote little poetry of any worth.

Early Life. Wordsworth was born in Cockermouth, Cumberland, into a family of wealthy landowners. At the age of eight, he began to study at an old grammar school at Hawkshead, in the Esthwaite Valley. Here he remained for nine years, spending much of his time outdoors. His love of nature began at this time, and grew with the years. From 1787 to 1791 Wordsworth was a student at Cambridge University, where he read the classics and Italian poetry. Wordsworth had begun to write poetry as a boy, and continued in college, but these poems were boyish imitations of the Augustan poets.

French Influence. In 1790, during his school vacation, he made a trip to France, Switzerland, and Germany. Soon after he was graduated he again went to France, which was then in the throes of the French Revolution. The liberal ideas of the revolution stirred Wordsworth, and he became an ardent Republican. He fell in love with a French girl, Marie-Anne Vallon, but left France in 1792 without marrying her. The Reign of Terror in France shocked him and he gradually lost his revolutionary ideas. Wordsworth became increasingly conservative. In later years the younger Romantic poets condemned him for abandoning his liberal principles.

Meeting with Coleridge. In 1793 Wordsworth published his first poems, *An Evening Walk*, and *Descriptive Sketches*, an account of a walking tour in the Alps. These works were largely modeled after those of Alexander Pope. Wordsworth had not yet thought up the principles which were to guide him in his later work. Two years later he went to live with his sister Dorothy in the Lake District. Here he met Coleridge and the two men became fast friends. The poet Robert Southey also moved to the Lake District, and the three men became known as "the Lake Poets." (See LAKE POETS.) Wordsworth and Coleridge decided to work together, and in 1797 Wordsworth and his sister moved to Alfoxden to be near Coleridge. The following year they produced *Lyrical Ballads*.

The book was a failure. The critics were shocked by its break with traditional poetry and were harsh in their judgment. In 1800 Wordsworth republished the volume with a preface explaining his theory of poetry. But this preface only served to anger the critics still more. Wordsworth spent the winter of 1798 and 1799 in Germany with his sister Dorothy and Coleridge.

Wordsworth's Marriage. On their return to England, the Wordsworths settled at Grasmere and lived there quietly for several years. In 1802 Wordsworth married Mary Hutchinson, whom he had known since boyhood. Five years later he published *Poems in Two Volumes*, which contained his "Ode to Duty," "Stepping Westward," "Ode on Intimations of Immortality," "The Solitary Reaper," and "The Happy Warrior." The critics attacked this book also. In 1813 Wordsworth moved



Martha E. Bonham

The Home Town of William Wordsworth was Cockermouth in the beautiful Lake District of northern England.

with his wife and sister to Rydal Mount and here he remained until he died. At forty-three he was made distributor of stamps for Westmoreland and Cumberland. The income from this position took care of the needs of his family.

Poet Laureate. The critics were slow to appreciate his work, but the great literary men of his time sang his praises. By 1830 even the critics recognized his genius and he came to be considered the greatest poet of his time. In 1843 Queen Victoria appointed him Poet Laureate of England. He wrote little after the appointment.

L.U.

See also **BARTRAM, JOHN AND WILLIAM; POET LAUREATE.**

His Works include *The Prelude; The Excursion; and Yarrow Revisited and Other Poems.*

WORK is the result that is produced when a force moves a body through a certain distance. For example, a man does work when he lifts, pushes, or slides an object from one place to another. But the man does not do work if he pushes or pulls an object without actually moving it. According to the definition of work which is used by physicists, mechanics, and engineers, work is accomplished only when a force moves an object. Work is measured by what is done rather than by the effort that is put into the work. Work differs from energy, in that energy is the ability of a substance to do work. This energy may be potential or kinetic, depending upon whether the substance is stationary or in motion. The rate at which work is done is known as power.

Work is always done by some agent, such as man, horses, wind, electricity, or steam. Work can also be done by water and compressed air. In each case, the working agent produces the force which causes the motion. This motion is always produced against some form of resistance. For example, climbing a mountain is a motion that is produced against the resistance which gravity offers. A horse pulling a wagon is a form of motion that is done against the resistance of the friction of the road. Wood offers resistance to being sawed or cut. In each case where work is done, there is a resistance to the motion that is produced in the work.

There are two factors that are involved when work is done. One is the amount of force applied and the other is the distance through which the force acts. The amount of work that is done is measured by multiplying the force by the distance. This is stated in the formula $W = fd$, where W is equal to work, f is equal to force, and d is equal to distance. Force is measured in pounds, tons, or any other measure of weight. Distance is measured in feet, inches, or some other linear measure. Work is measured in foot-pounds, inch-pounds, foot-tons, etc. For example, if one pound of apples is lifted one foot, the work done would be equal to one foot-pound. If an object weighing 50 pounds is lifted 4 inches, the work done would be 200 inch-pounds. If, however, a 4-pound object would be lifted 50 inches, the work done would still be 200 inch-pounds.

Scientists measure work in the centimeter-gram-second system, also known as the C.G.S. system. According to this system, force is measured in a tiny unit called a *dyne*. If a force of one dyne moves an object one centimeter, the work done is equal to one dyne-centimeter. This unit of work is called one *erg*. The erg is a very small quantity of work and therefore not suitable for all types of measurement. For most measurements, a unit known as the *joule* is used. One joule is equal to ten million ergs.

E.A.FE.

See also **DYNE; FOOT-POUND; JOULE; THERMODYNAMICS.**

WORKER. See **ANT; BEE; TERMITE.**

WORKERS. Many organizations of workers are listed in **THE WORLD BOOK ENCYCLOPEDIA** under the key word in the name of the organization. Example: **STEELWORKERS OF AMERICA, UNITED.**

WORKING DRAWING. See **ARCHITECTURE** (How the Architect Works).

WORKMEN'S COMPENSATION. Loss of income due to accidents on the job has been a growing problem of workers since the introduction of machine methods to industry. Today, most countries of the world have laws providing pay and medical help for injured workers, and pensions to their dependents in cases where death occurs.

The first workmen's compensation laws were passed in Germany in 1883. Austria followed the example of Germany in 1887, and Norway, Finland, France, Denmark, and Great Britain passed laws in the 1890's. During the first decade of the 1900's most European countries had workmen's compensation laws.

There was long opposition to workmen's compensation laws in the United States. Employers based their objections on the fear of increased production costs, and the danger of habitual malingering on the part of the workers. They also argued that such protection to workers was socialistic. Maryland passed the first state compensation law in 1902 but this and other state laws passed during this decade were declared unconstitutional by the Supreme Court. The cause of workmen's compensation was greatly aided by the passage of the Federal Employer's Liability Act in 1908, which made interstate railways responsible for injuries to their employees. Between 1910 and 1920 forty-two states and three territories passed similar compensation laws. By 1940 all the states except Mississippi had workmen's compensation laws.

Provisions and administration of the various state workmen's compensation laws differ greatly. In general, the laws are designed to provide compensation and medical care for injured workers, artificial limbs and other appliances, and death benefits and pensions for the dependents of workers killed on the job. Most of them also provide rehabilitation for new jobs to workers who cannot continue in their old jobs because of their injuries. One of the most difficult struggles has been that to include occupational diseases among the causes requiring compensation. Progress in this direction is shown by the fact that up to the end of 1945 thirty-two states had provided compensation for occupational diseases.

R.D.P.

WORKS PROGRESS ADMINISTRATION. See ADULT EDUCATION; NEW DEAL (Leading New Deal Agencies); ROOSEVELT, FRANKLIN DELANO (Administrations as President [Unemployment]).

WORLD. An observer on Mars would see the earth as a bright bluish planet. This planet is described in the article EARTH. But the man on Mars could not see the *world*, with its crowded roads, its busy cities, its farms and ranches, and its fleets that sail the oceans and fly the air. If bacterial or atomic warfare should make an end of human life, the *earth* would continue on its path around the sun. But the *world* as we know it would have vanished.

How Big Is the World? Nearly 2,300 years ago, Alexander the Great wept because he had conquered all the world, and there was nothing left for him to seize. But the world that Alexander knew covered only about 3,000,000 square miles, which is less than $\frac{1}{15}$ of the area of the entire world. It did not include a single one of the cities that are among the twenty largest ones on earth today. The Roman world was much larger than the world of Alexander. But it, too, was tiny compared with the world of today.

There is a sense in which everyone makes his own world. The newborn baby has a very small world indeed, for only a few persons affect his life. As he grows older, his world grows with him.

Some people in all countries still live in very small worlds. Once this was natural and almost unavoidable. Today it is unnecessary and dangerous. It may even become tragic. The world has become so closely tied together that the course of events in any major country affects the well-being of millions of people in all parts of the globe.

A World Outlook. Almost everyone can understand how the interests of his own country are bound together. It takes no great wisdom to see that a disaster in Texas is a disaster for Massachusetts. But we do not always realize that the same thing is true for all parts of the world.

For example, during the depression of the 1930's the United States cut down its overseas buying in order to make jobs for people at home. Purchases from Germany were reduced about four billion dollars. The people of Germany had their own depression to fight, and the loss of American business was one of several things that made the German depression worse. A few years earlier the Germans had laughed at the rabble rouser, Adolf Hitler, and put him in jail. But the depression left them

ready to follow him, as they would probably have followed any leader, no matter how reckless or vicious he was, if he had plans for giving Germans work to do and bread to eat once more. Many Americans said "What is that to us? The Germans must look after themselves. If they can't do it, that's their problem." We need not be concerned with it." The rise of Hitler had a worldwide effect. It was one of the chief immediate forces which drew the people of the United States and most of the other peoples of the world into World War II.

In 1853 Commodore Matthew Perry opened up Japan to American trade at gun point. A few Americans were indignant, but most of them were happy about it. The Japanese learned Western ways quickly and well. Not until World War II did it become clear how much too well they had learned. Today no American dares to forget that conditions in Japan have an important bearing on his own life.

Dividing the World. More than two billion persons live in the world. They are all much alike, but each one is a little different from every other human being on earth.

We can divide these people into many different kinds of groups. We can classify them roughly according to race. We can split them up into nationalities. We can divide them into upper, middle, and lower classes, or into rich and poor. We can separate them according to their religions. We can divide them into the peoples of the Eastern and Western hemispheres. We can divide them by age groups, or on the basis of sex. But we can no longer risk the attempt to divide people into groups of those who matter and those who do not.

Race Differences. The races of mankind differ a little in skin color and other physical characteristics. But all responsible biologists and anthropologists are agreed that when they have classified a person as Caucasoid, Mongoloid, or Negroid, they have said nothing whatever about his talents or abilities. So far as anyone knows, genius is just as common in one race as it is in another, and the world can not afford to waste any of it. It is ironic that Adolf Hitler, in his attempt to make Germany "pure" in both race and political beliefs, should have driven out talented scientists who helped to make the atomic bomb.

Nationality Differences. The world is divided into many nations, each of which claims to be sovereign. A sovereign nation is one that can do as it pleases. It can impose tariffs, make treaties, or wage war without asking permission of anyone.

Once the states of the United States were sovereign nations, bound together in a confederation. But the acts of each state had so great an effect upon the lives of the people in all the other states that keeping them separate was too costly. Today, the act of one nation may make or break the economic life of another. Many thinkers believe that national sovereignty must take second place to world control, or world government, for the security of all the people of all nations.

Class Differences. Since earliest history, mankind has been divided into classes, largely on the basis of wealth and power. Special classes have grown up even in democratic America. In most parts of the world the class lines are more sharply drawn than they are in the United States. The central idea of social class is that

THE WORLD

[illegible]

NOTE: Symbol † denotes that population figures are based on the area of the country prior to March 1938.

some people "really matter," while others may properly be used as means or instruments to support the ruling class.

Class divisions are hard to break down. Even the Soviet Union, which set out to become a "classless society," now has sharply marked social classes. Class conflict, long continued, can paralyze a nation or a world. Social class is probably another of the luxuries which the world must somehow cut from its budget.

Americans long ago learned to say "all men are created equal." If the world as we know it is to endure, they and other peoples must learn to mean this as well as to say it.

Uniting the World. For thousands of years, men have dreamed of making the world one great state. Jesus of Nazareth taught the doctrine of world brotherhood. The Stoics of ancient Greece and Rome dreamed of a world society. Conqueror after conqueror has tried to unite the world by bringing all of it under his control.

Natural barriers once cut the world into parts. Oceans, deserts, rivers, mountains, and wilderness separated group from group for hundreds of years. Today these natural barriers have been overcome. In terms of travel time, no two places on the earth are as far apart today as Massachusetts and Georgia were in colonial days. No matter where you stand, a chartered plane can put you anywhere else in the world within two days.

The barriers that divide the world today are all man-made. The world is a single market and a single economic unit except for man-made tariffs, currency blocs, and trade agreements. Not natural conditions, but man-made immigration laws keep the peoples of the world from going where they please. Radio and television are sure to bring the development of a single world mind, unless the governments of the world use the iron curtain of censorship to "protect" their people from knowledge and understanding. No longer is the unifying of the world an impossible task. If the many men in all lands, who now labor to keep it apart and thus protect some small special interest of their own, will stop doing so, the world will come together of itself.

A.G.R.

Related Subjects. The reader is also referred to:
 Aviation (map)
 Civilization
 Geography
 Government
 History

Facts in Brief about the World (Most of the figures given here are approximate) The Earth Itself

Age: More than 2,000,000,000 years.
Area: 196,950,000 square miles, including 57,510,000 square miles of land and 139,440,000 square miles of water.
Circumference: at equator, 24,902 miles; around the poles, 24,859 miles.
Diameter: at equator, 7,926.56 miles; through the poles, 7,899.74 miles.
Weight: 6,592,000,000,000,000,000 tons.
Highest Point: Mount Everest, 29,141 feet above sea level.
Lowest Point: Surface of Dead Sea, 1,290 feet below sea level.

The People	
Population by Continents:	
Africa	157,333,000
Asia	1,326,000,000
Australia and Oceania	11,000,000
Europe	500,000,000
North America	184,255,000
South America	89,000,000
Total Population:	2,267,585,000

Population by Races: Caucasoid, about 33 per cent; Mongoloid, about 43 per cent; Negroid, about 24 per cent.

Average Density of Population: 42 persons per square mile.

Chief Occupation of the World's People: Sixty per cent of the people are engaged in agriculture. Each year they plant crops on about 2,589,800 square miles, or 4½ per cent of the land area of the earth.

Average Rate of Literacy: 41 per cent.

WORLD AIRWAYS MAP. See AVIATION.

WORLD CALENDAR. See CALENDAR.

WORLD COURT. See PERMANENT COURT OF INTERNATIONAL JUSTICE.

WORLD ECONOMIC CONFERENCE OF 1933. One result of the depression of the 1930's was the World Economic Conference, held in London in June and July of 1933. The Conference, attended by delegates from all the Great Powers, tried to stabilize national currencies as a means of aiding world recovery. It ended in failure

when President Franklin D. Roosevelt refused to support its recommendations.

WORLD FEDERATION OF TRADE UNIONS. See CONGRESS OF INDUSTRIAL ORGANIZATIONS (Program).

WORLD FRIENDSHIP. See INTERCULTURAL EDUCATION.

WORLD'S COLUMBIAN EXPOSITION. See EXPOSITION (Some Important Expositions).

WORLD SERIES. In October of each year, millions of baseball fans throughout the United States follow with feverish excitement a series of games played between the pennant-winning teams of the American and National leagues. The team that wins four games out of a possible seven is hailed as the world champion of baseball for that year. This set of games has become the classic feature of baseball, and is called the *World Series*.

The first modern World Series was played in 1903.

The Boston Red Sox of the American League defeated the Pittsburgh team of the National League. The series was not held the following year because John McGraw, the colorful manager of the New York Giants, refused to match his team against Boston, which had won again in the American League. But in 1905 the series was resumed.

The World Series games often take in more than a million dollars in gate receipts and payment for broadcasting privileges. The players share in 60 per cent of the money received for the first four games. This money is divided among the two teams, with 60 per cent of it going to the winners and 40 per cent to the losers. The amount received by each member of the winning team is usually more than \$6,000.

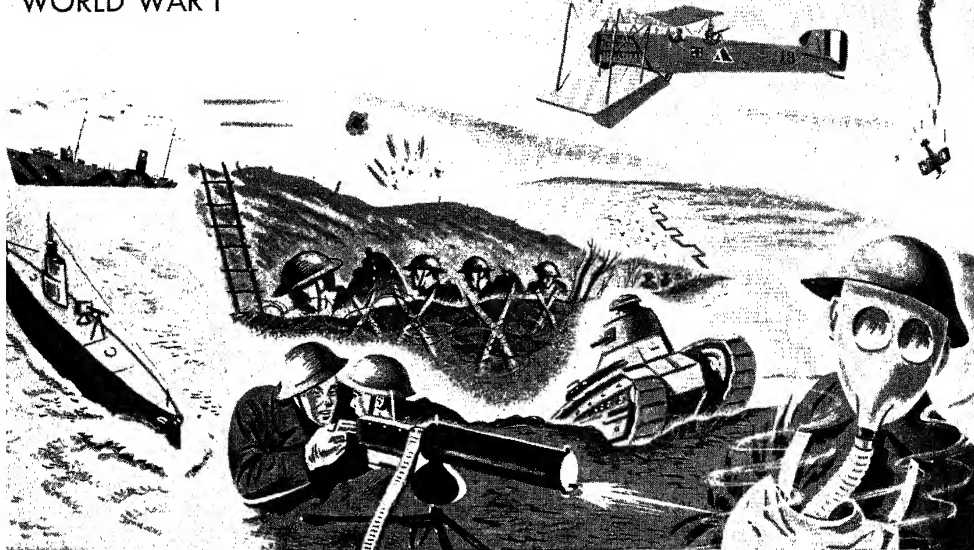
E.D.M.

See also AMERICAN BASEBALL LEAGUE; BASEBALL; NATIONAL BASEBALL LEAGUE.

WORLD'S FAIR. See CENTENNIAL EXPOSITION; EXPOSITION.

WORLD'S GREAT PAINTINGS. See PAINTING (table).

WORLD WAR I



WORLD WAR I began on July 28, 1914. Before the fighting ceased on November 11, 1918, almost eight million soldiers had lost their lives in the greatest struggle the world had seen. The war cost the nations that took part in it about \$200,000,000,000. Its results were so dreadful that many people hoped mankind had learned a lesson. Winners and losers alike suffered so terribly that it was hard to believe the countries of the world would ever take up arms again. But the war did not settle the problems that had caused it. Little more than twenty years after the armistice that was supposed to end World War I, the world was again at war. We use the name World War II for this second conflict, but many historians regard it as part of the great struggle that began in 1914.

Causes of the War

No nation wanted a world war in 1914. But the threat of war had hung over Europe since the days of the Franco-German War in 1870 and 1871. Each great country was trying to increase its own wealth and power, and there had been many clashes. For example, Great Britain and France had seized the most desirable parts of Africa before Germany decided to get into the colonial race. Germany tried to get a foothold in Morocco, where France had great influence. But Great Britain came to the aid of France and the German ambitions were checked. Many Germans felt that the only hope for their country was to build a military and naval power that could challenge the strength of Great Britain and France.

Russia and Austria both wanted to control the Balkans. Most of the important countries of Europe had interests in the Balkan region, and the clash of their interests there led to two minor wars. See **BALKAN WARS**.

The Great Alliances. All the great powers believed that the threat of force was the way to get what they wanted. But whenever a country yielded to threats of

force, it was likely to start building up its military strength so it would not have to yield again. And each country sought allies in this game of bluff and sword rattling. Germany was firmly allied with Austria. This alliance threatened both France and Russia, and these two countries drew closer together. Germany feared war on two fronts and strengthened its army. France had to do the same. And so it went over most of the continent.

By 1914 two groups of countries faced each other threateningly. On the one side were Germany, Austria, and Italy. On the other side were Great Britain, France, and Russia. But Italy had several disputes with Austria, and hoped to win back territory lost to the Austrians in earlier days. See **TRIPLE ALLIANCE**; **TRIPLE ENTENTE**.

Growing Fear. No one knew when war might come. Everyone feared war and hoped to avoid it, but all countries wanted to be ready to fight if necessary. Thus the fear of war became a leading cause of World War I. No country could tell whether or not another was bluffing. If any country so much as mobilized its troops, the neighboring countries could not afford to wait for developments. The common people of Europe might see no cause for fearing a general war, but the statesmen knew that any threatening act by any great power could make war a fact very quickly.

"Drang nach Osten." The direct cause of the war arose in Austria. For some time, that country's policy had been to expand toward the east, in order finally to get a port on the Aegean Sea. This policy, known as the *Drang nach Osten*, or *push toward the East* had already made some progress. But Serbia and Montenegro were squarely across the path of the *Drang nach Osten*, and Russia had promised to help these two countries protect their borders.

Two Pistol Shots. On June 28, 1914, the Austrian crown prince, Archduke Francis Ferdinand, and his wife Sophie, Countess of Hohenberg, were shot at Sarajevo, the capital of the Austrian province of Bosnia. The

assassin was Gavrilo Prinzip, a Serb. This provided just what some of the more ambitious Austrian statesmen wanted—a reason for attacking Serbia. Austria could easily defeat the Serbs, and thus take another long step eastward.

The Austrian Ultimatum. The Austrian Government claimed that the government of Serbia was responsible for the crime. Germany supported Austria in this claim. On July 23, 1914, Austria sent a stiff ultimatum to Serbia, and acceptance was demanded on the following points within forty-eight hours:

(1) That the Serbian Government should give assurance that it was not in conspiracy against the Austro-Hungarian monarchy, and that such statement should be published in the Serbian official journal.

(2) That the published declaration should express regret that Serbian officers had engaged in anti-Austrian demonstrations, and that the Serbian Government should take action against all who had taken part in such demonstrations.

(3) That the declaration should be communicated by the king of Serbia to his army as an order of the day and published in the official bulletin of the army.

(4) That all papers which had incited hatred of Austria should be suppressed.

(5) That the Narodna Odbrana (National Defense) should be dissolved and its property confiscated.

(6) That methods of education in Serbia which fomented feeling against Austria-Hungary should be eliminated.

(7) That officials and officers guilty of propaganda against Austria-Hungary be dismissed, the Austrian government to have the right to name such officers and officials.

(8) That officials of the Austro-Hungarian government should assist Serbia in suppressing in Serbia the movement against the integrity of the Austro-Hungarian government, and take part in the judicial proceedings in Serbia against persons implicated in the Sarajevo crime.

(9) That Serbia furnish Austria-Hungary with explanations of utterances of high Serbian officials who ventured to speak ill of the Austro-Hungarian Government after the Sarajevo crime.

Austria-Hungary Declares War. Most of the statesmen of Europe felt that Serbia could not accept these demands. The telegraph wires of Europe were loaded with dispatches sent from one power to another in an attempt to avoid war. France was concerned as an ally of Russia, Great Britain as an ally of France and friend of Russia, Italy as an ally of Austria and Germany, and Germany as Austria's ally.

The Serbs replied promptly, and accepted every demand but the eighth one. To let Austrian troops come into Serbia and put down the nationalist movement was too much for a sovereign state to permit. Austria announced that the Serbs had failed to meet the demands of the ultimatum. On July 28, 1914, Austria-Hungary declared war on Serbia.

DECLARATIONS OF WAR

Twenty-three countries became involved in World War I. The declarations of war are listed here in order:

1914

Austria-Hungary, on Serbia	July 28
Germany, on Russia	Aug. 1
Germany, on France	Aug. 3
Great Britain, on Germany	Aug. 4
Austria-Hungary, on Russia	Aug. 6
Serbia, on Germany	Aug. 6
Montenegro, on Austria-Hungary	Aug. 7
France, on Austria-Hungary	Aug. 10
Great Britain, on Austria-Hungary	Aug. 12
Montenegro, on Germany	Aug. 12
Japan, on Germany	Aug. 23
Austria-Hungary, on Japan	Aug. 25
Austria-Hungary, on Belgium	Aug. 28
Russia, on Turkey	Oct. 30
France, on Turkey	Nov. 5
Great Britain, on Turkey	Nov. 5

1915

Italy, on Austria-Hungary	May 23
San Marino, on Austria-Hungary	June 2
Italy, on Turkey	Aug. 20
Russia, on Bulgaria	Oct. 5
Bulgaria, on Serbia	Oct. 14
Great Britain, on Bulgaria	Oct. 15
France, on Bulgaria	Oct. 16
Italy, on Bulgaria	Oct. 17

1916

Germany, on Portugal	Mar. 9
Austria-Hungary, on Portugal	Mar. 16
Italy, on Germany	Aug. 27
Rumania, on Austria	Aug. 27
Germany, on Rumania	Aug. 28
Turkey, on Rumania	Aug. 30
Bulgaria, on Rumania	Sept. 1

1917

United States, on Germany	Apr. 6
Panama, on Germany	Apr. 9
Cuba, on Germany	Apr. 10
Greece, on Germany	July 2
Siam, on Germany	July 22
Liberia, on Germany	Aug. 4
China, on Germany	Aug. 14
Brazil, on Germany	Oct. 26
United States, on Austria-Hungary	Dec. 7
Panama, on Austria-Hungary	Dec. 10

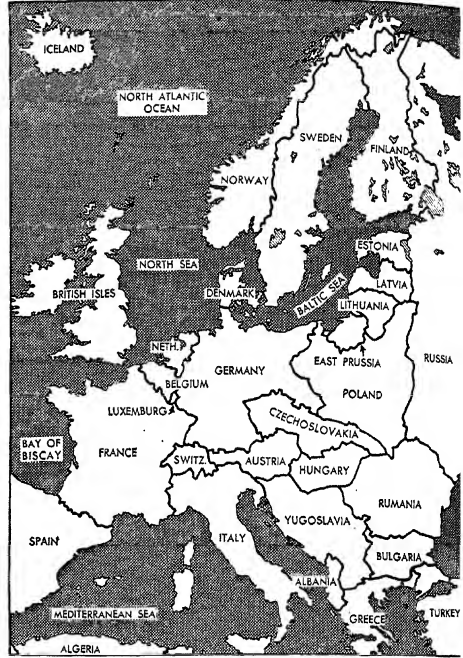
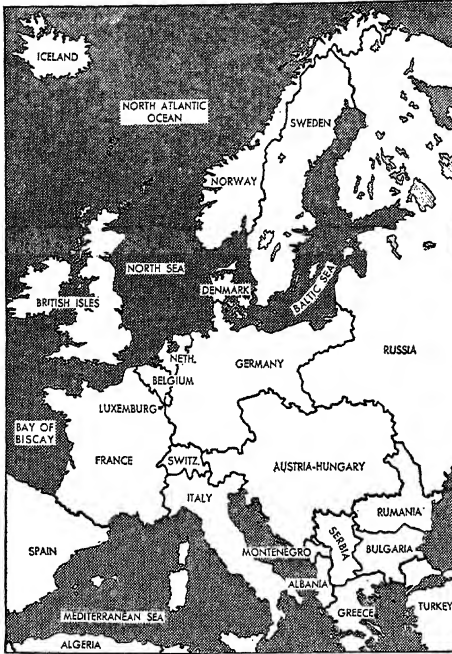
Not all the countries which declared war took an active part in the fighting. Some sought merely to give political support to friendly powers.

The following countries cut off diplomatic relations with Germany, but did not declare war:

Bolivia	Haiti	Santo Domingo
Costa Rica	Honduras	(now the Dominican Republic)
Ecuador	Nicaragua	
Guatemala	Peru	Uruguay

Considered from the standpoint of population, the nations which directly entered the war against the Central Powers (as they were called because of their central position in Europe) possessed within their home territories and in their overseas possessions, on whose resources they could draw, over three fourths of the world's population. Millions had no intention of taking an active part, but their influence was a force. Tabulated, the populations ranged themselves as follows:

Against Central Powers	1,335,307,000
Broke with Central Powers	33,014,000
Anti-German	1,368,321,000
Germanic Allies	156,572,000
Neutral Nations	166,853,000
Pro-German and Neutral	323,425,000



Europe at Beginning of World War I in 1914 (Left) and After the Signing of the Peace Treaties in 1919 (Right)

The Conflict Spreads. Russia at once made it known that it considered its own interests linked with those of Serbia and the smaller Slav states in the Balkans. Russia began mobilizing, and declared it would mass its troops for war the day Austrian troops crossed the Serbian border. Austria chose to believe that the Russians were bluffing and would not dare to attack the strong Central Powers.

Russia's attitude affected France and Great Britain, as members of the Triple Entente. Germany spoke up in favor of localizing the dispute—which meant letting Austria-Hungary punish Serbia and take from that country what it pleased without interference from any other country. But everyone knew that Germany would support its ally no matter what happened. Italy announced that it would remain neutral.

The Russian mobilization was a direct threat to Austria-Hungary. In support of its ally, Austria, Germany declared war on Russia on August 1, 1914.

First Weeks of the Conflict

At the beginning of the war, the world was amazed at the thorough preparedness of the German Empire to strike a mighty blow. The German Emperor, in command of the most powerful army the world had seen, became the dominant figure in Europe. The German General Staff planned to overwhelm France within a month or less, then turn sharply and defeat Russia in the east. With these two powers reduced, it would next turn its attention to Great Britain, which was not expected to offer much resistance. In the south, whatever resistance the Balkan states offered was to be speedily

overcome, and a clear road was to be opened into Asia.

As soon as it was clear that war could not be prevented, France moved 200,000 men toward its eastern frontier. These forces took positions six miles from the border, below the Belgian and Luxemburg borders. No one knew where Germany planned to strike. Dispatches reported miles upon miles of men clad in gray-green uniforms, marching west—a constant stream day after day, so vast as to be unbelievable. The German chiefs asked Belgium for freedom to pass through the kingdom, as the easiest route to France. The German Government promised full payment after the war for any damage which might be done to Belgian property in a peaceful passage.

Invasion of Belgium. "Belgium is a nation, not a road," King Albert is said to have declared. His government refused the German demand for free passage through Belgium into France, and the German armies were hurled upon Belgian soil.

The attack on Belgium brought Great Britain into the war. Britain had separate treaties with France and Germany, pledging help to either country if the other invaded Belgium. The German attack began August 4, and Great Britain had declared war before the day was over.

Belgium had only 200,000 soldiers to throw against Germany's flood of men, but for two weeks it checked that flood. And in those two weeks the Central Empires lost their chance of ending the war quickly. France gained time to swing troops across the path of the invader, and Great Britain had time to put its little regular army of 175,000 men into northern France.

The great Belgian fortress of Liège fell on August 15, eleven days after the invasion had begun. Four days later, Brussels was occupied, and the Belgian government moved to France. Namur was taken on August 23, and Louvain was sacked and partly destroyed on August 25.

First Battle of the Marne. On to France marched the gray-green German troops, driving back the French, Belgians, and British. Then, on September 5, 1914, the Allied armies under Marshal Joseph Jacques Césaire Joffre and General Joseph Gallieni checked the attack of the German General Alexander Von Kluck at the Marne River. On September 6 the actual Battle of the Marne began. On September 8 the Germans began to retreat, and did not stop until they reached the Aisne River. France was saved, for a time at least, although the enemy had seized one tenth of its richest territory.

Fall of Antwerp. Meanwhile, the Belgian field army had fallen back on the entrenched camp of Antwerp. It was besieged by the German forces under General Erich von Falkenhayn, who planned to occupy the Channel ports. On September 28 the German guns began the bombardment of Antwerp. Antwerp surrendered on October 10, and the Belgian field army escaped along the Flanders coast. The loss of Antwerp was a severe

blow, but the German plans to advance down the coast were upset by the delay.

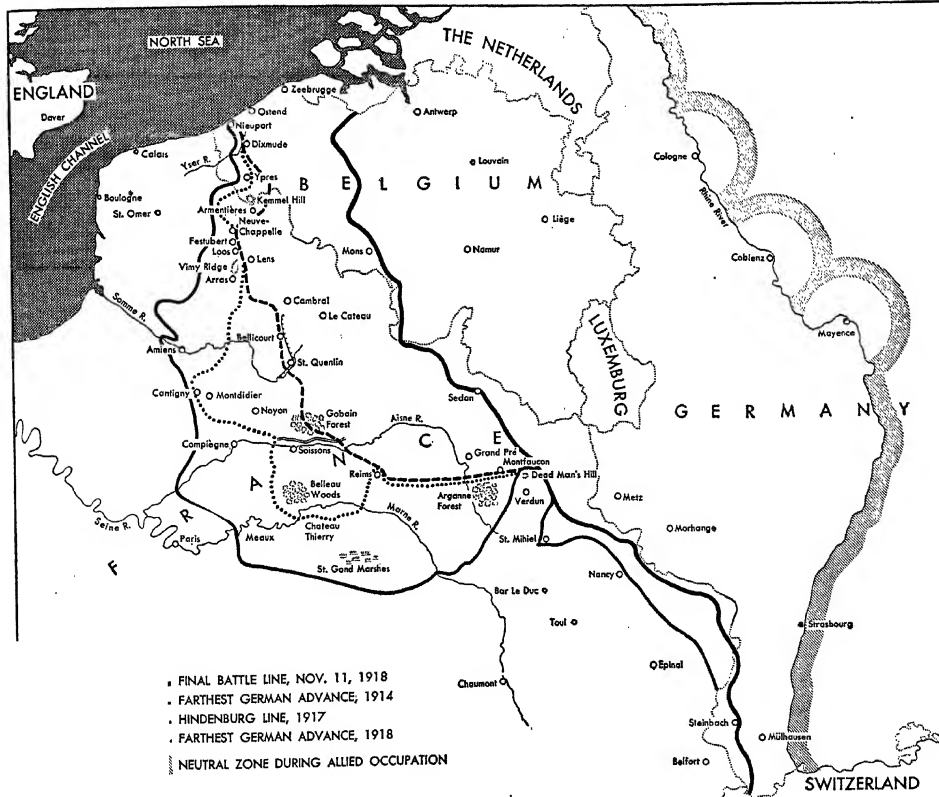
British Reverses. The main British force was transferred from the Aisne to the new left of the Allied line. In the heroic defense at Ypres, Belgium, the British regular army was almost wiped out.

Great Britain now began the long task of building a new fighting force. By the end of the year, nearly 1,000,000 men had enlisted, and the British Empire had altogether some 2,000,000 men under arms. But even a year after the Battle of the Marne, the British army was poorly prepared to take its place by the side of France in the fighting field. Not until 1917 did British fighting power reach full strength.

The Battle Fronts

In the early days of the conflict, three great battle lines were established. In most places, both sides dug trenches to protect themselves. A new kind of war developed, in which swift movements and pitched battles played almost no part. Month after month, entrenched armies held their positions, hoping to wear out the enemy.

The Western Front. The line which held the closest attention of the world was the Western Front. This line



Map of the Western Front during World War I

extended for 450 miles, from the English Channel to Switzerland, a distance about half as great as that from New York City to Chicago. All along that winding course were opposing walls of men and glistening steel. After three years of war, no point in the line had been bent as far as twenty miles by either side. But over a million men had died in the attempt to charge the lines.

Two high German officers held the eastern side of the line during the greater part of the war — Crown Prince Rupprecht of Bavaria in the north, and the German crown prince, Frederick William, in the south. The British commander during the first year was Sir John French (afterward Earl of Ypres). He was replaced in 1915 by Field Marshal Sir Douglas Haig. In the third year, Marshal Joffre of France gave way in the field to General Robert Nivelle, who in turn was replaced by General Henri Philippe Pétain, then by Marshal Ferdinand Foch. When, in 1917, the United States joined the Allies on the Western Front, General John Joseph Pershing commanded the American divisions.

The Eastern Front. Second in interest, but greatest in length, was the line along the eastern boundaries of the Central Empires. It stretched from Riga, on the Baltic Sea, to the shores of the Black Sea, a distance of 1,125 miles. For Russia, Grand Duke Nicholas commanded



Map of the Balkan Campaign during World War I

for a year and a half. Then the Czar took command. In the north, the German General Paul von Hindenburg, assisted by General Erich F. W. Ludendorff, won an overwhelming victory at Tannenberg, and became so popular that he was made chief of the General Staff. Farther south, August von Mackensen commanded the German armies.

Other Fronts. When Italy entered the war in 1915, another front was established. It ran from Switzerland along the Italian frontier almost to Trieste, and was about 320 miles long.

Before the war ended, another line was established through the southern Balkan regions. This line was about 300 miles long. Only the main points were fortified, but this took an army of half a million men.

Thus there were on the continent of Europe a series of battle lines long enough to stretch from Chicago to San Francisco.

The War through 1915

In the West. The Western Front settled down late in 1914, and remained almost unchanged for two years.

NATIONS ENGAGED

ALLIES

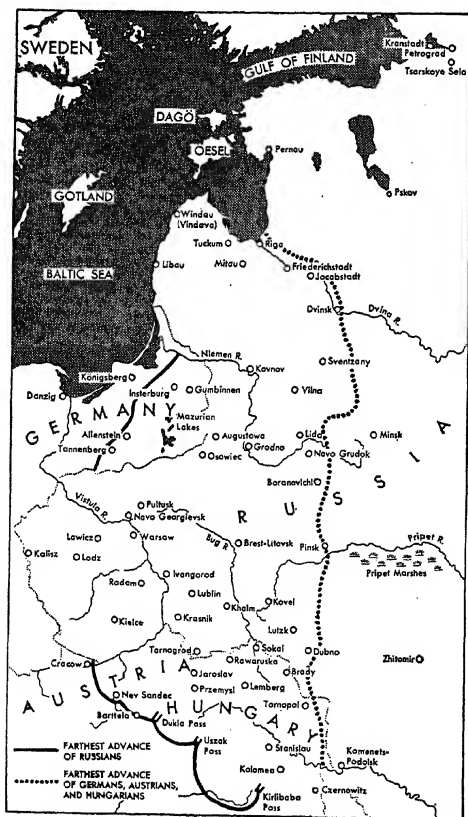
United States
Great Britain
France
Russia
Italy
Belgium
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Rumania
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Portugal

Japan
Montenegro
San Marino
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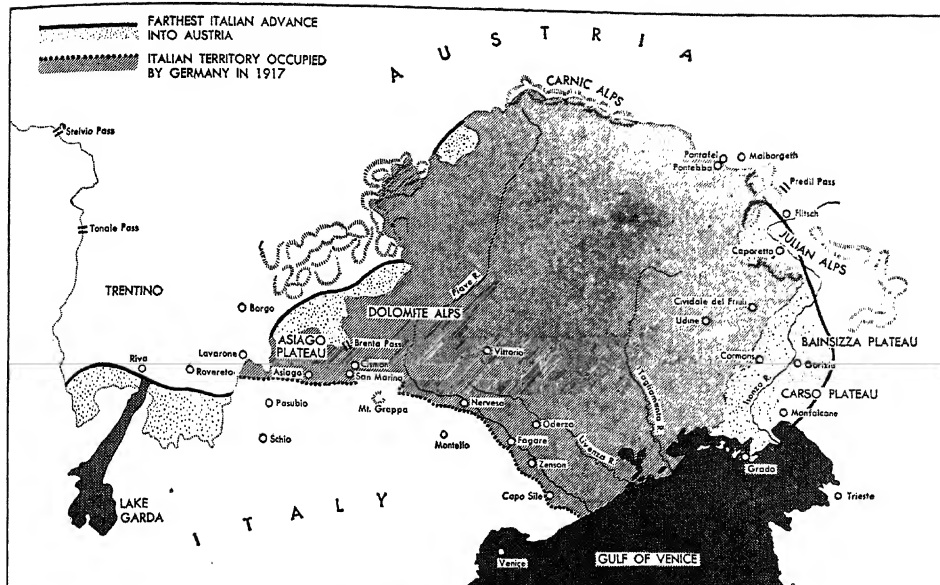
CENTRAL POWERS

Germany
Austria-Hungary

Turkey
Bulgaria



Map of the Eastern Front during World War I



Map of the Italian-Austrian Front during World War I

Great Britain and France took advantage of the chance to build munitions plants. Before the end of 1915, both countries were making more guns and shells every week than they had previously turned out in three months.

The actual fighting took the form of artillery warfare and a few movements back and forth by both sides. Early in January the French took the offensive in Alsace and captured Steinbach. They also attacked successfully near Soissons, but later lost all they had gained. The British attacked farther north, in the direction of Lille. They took Neuve Chapelle in March, and the enemy never recovered it. The German crown prince made many attacks in the direction of Verdun, on a straight road to Paris, hoping to cut off Verdun and its fortress. But the French resisted successfully. Verdun's fate long hung in the balance, and some of the bloodiest battles of the war were fought near the city's fortress.

In April, 1915, the Germans began a strong movement to capture the French city of Calais on the English Channel. By the use of poison gas, never before used in war, they gained nearly three miles. Two German attacks on Ypres were turned back, largely by the heroism of Canadian regiments. Calais was not threatened again until 1918.

All through the summer of 1915, bitter fighting continued from the trenches. Western Belgium and north-eastern France were a maze of trenches. At one point, there were 200 miles of trenches on a line of twelve miles. The French slowly crept toward Lens, the most important coal mining town in France, which was held by the Germans. The most important Allied gain was the capture of a vast German underground fortress of steel and concrete, known as the Labyrinth.

In September the British and French began a tremendous drive in the French districts of Champagne

and Artois, and in Belgium. The Germans were driven back three miles, but the Allies could not break through. At the end of the year, the Allies had won back only fifty square miles of territory from the invaders.

On the Eastern Front. The Germans hoped Russia would first attempt to strike through Poland in the direction of Berlin. German forces could easily strike from the north and south and cut off Russia's finest army. But Grand Duke Nicholas first attacked farther north, in East Prussia, and far to the south, in Galicia. Von Hindenburg defeated the Russians in the north, gaining successes in the Masurian Lakes region. But in the south the Russian armies were at first successful. They advanced against the Austrians, took the important city of Lemberg (Lwów) on September 3, 1914, and after a seven-month siege captured Przemyśl on March 22, 1915.

Von Hindenburg attacked in Poland. He was within seven miles of Warsaw in October, 1914, when Nicholas turned him back. The Austrians were slaughtered in the Carpathian snows, and Kraków was threatened. Russia's victorious army followed too far, and Von Mackensen's Germans, by a marvelous feat at arms, nearly wiped them out. Again Von Hindenburg struck in the direction of Warsaw, but again he was checked by Nicholas. Both sides dug in, and their positions were unchanged until the middle of 1915.

The Austrians, with great numbers of fresh troops, tried to attack the Russians in Galicia, and were badly defeated. The Russians seized all the important Carpathian passes, and held them until June, 1915. At the end of 1914, Germany and Austria-Hungary were on the defensive along most of the Eastern Front.

In 1915 the Russians began to run out of munitions. It became known later that high officials in the empire

were criminally responsible for this condition. The Central Powers massed powerful forces all along the line, and gained much territory. Russia was driven out of Galicia and lost Lemberg. In June Przemyśl again fell into Austro-Hungarian hands. Warsaw surrendered early in August. In September the Central Powers captured Vilna and threatened Riga. The czar himself took command on the Eastern Front, with General Nikolai Russki as chief of staff. Grand Duke Nicholas was shifted to the Caucasus.

The Dardanelles Campaign. Early in January, 1915, the Russian high command appealed to Great Britain for an attack which would relieve the pressure on Russia's army in the Caucasus. The British war council was unable to spare troops, and decided upon a naval expedition to the Dardanelles, to take the Gallipoli Peninsula. The British also hoped to capture Constantinople (Istanbul). With French aid they prepared a naval force, made up mainly of old vessels. After a bombardment of the Turkish forts, the fleet entered the straits on March 18. Several ships struck mines and sank, and the attempt was abandoned.

The British then made preparations to land a military force on the peninsula. On April 25, British, French, Australian, and New Zealand troops landed at three points on beaches strewn with barbed wire and swept by machine-gun fire. They found it impossible to advance farther, even with reinforcements. The Allied troops dug themselves in and held their foothold on the peninsula until the end of the year, when it was decided to withdraw them. The failure of the campaign had far-reaching effects. It not only left Constantinople in Turkish possession, free from the danger of a second Allied attack, but it also lowered Allied prestige throughout the Balkan countries.

Serbia Overwhelmed. Austria-Hungary overran Serbia, but not so quickly as the Central Powers had hoped. Overwhelming Austro-Hungarian forces captured Belgrade, just across the Danube River, on the border, on December 2, 1914. Two weeks later, in a strong counter-offensive, Serbia regained its capital. Several Austrian commanders were dismissed in disgrace. After this Serbian success, typhus swept through Serbia's army, and it had little fighting power for the next six months.

In June, 1915, Bulgaria entered the war on the side of the Central Powers. The Bulgarian Government saw in the war a chance to get back the lands lost during the earlier Balkan Wars. The Bulgarians moved against Serbia in August, and German and Austrian troops were drawn from the Eastern Front to help them. By December, 1915, all of Serbia except the southern border and a narrow strip in the west was in enemy hands.

The "Salonika Fiasco." At the beginning of October, 1915, when Serbia's danger was realized, Great Britain and France had sent troops from Gallipoli to Salonika, the shipping center for the Balkan Peninsula, on the only usable road to Serbia. At the Serbian frontier, this force found itself cut off by Bulgarians, and fell back to Salonika, where it remained until 1918. Fresh divisions of Allied troops were sent to Salonika, and there the defeated Serbian army was reassembled. These forces accomplished nothing of importance, although they numbered half a million men. To all intents and

purposes they were interned at Salonika. Yet the Allies dared not withdraw them, for fear of losing prestige.

The War in 1916

In the West. Before the end of 1915, the Central Powers made a bid for peace, based "on the map of Europe." This meant that they should keep what they had taken. The Allies turned down this proposal.

The biggest event of 1916 was the battle for Verdun, the central gateway to Paris. The German crown prince commanded the army which began the assault. The battle raged from February 21 until near the early part of September. The Germans managed to advance only four miles in six months, and they were three miles from the main fortress of Verdun when they gave up the attempt.

Especially bitter were the assaults and counterassaults around such never-to-be-forgotten spots as Fort Douaumont, Le Mort Homme (Dead Man's Hill), Haucourt, Bethencourt, Fort Vaux, Hill 304, and Hill 305.

While the attention of the world was centered on Verdun, the Allies were preparing a great offensive farther north, along the Somme River. By this time the Allies could equal the enemy in the matter of artillery. Their great guns destroyed miles of trench works of steel and concrete on which the Germans had spent months of effort. Military tanks were first used in an attack the Allies made on Courcellette. Day after day until December, the Allies steadily pushed back the Germans, although the Germans fought stubbornly.

Plot in Ireland. A revolt in Ireland, from April 24 to May 1, threatened serious damage to the Allied cause. Sir Roger Casement, who had held important British posts of honor, was captured while trying to smuggle German arms into Ireland. He was tried by court-martial and shot. Six other leaders in the uprising also were executed.

In the East. Russia had taken advantage of the winter months to organize more thoroughly and to gather great stores of munitions. In June the czar's armies began an offensive on a large scale near the southern end of their 1,100-mile battle line. Before winter, Russia had overrun the crownland of Bucovina, and again threatened Lemberg. The Austrians were driven back into the Carpathian Mountains.

On the Italian Front. On May 3, 1915, Italy denounced the Triple Alliance, and on May 23, the country declared war on Austria. In a few days, Italy was ready to take the field against Austria-Hungary. For two months, small battles were fought on many parts of the 320-mile front. In August, 1916, Italy made important advances along the Isonzo River and plateau. The high point of the year's work was the capture of Gorizia. Before winter stopped operations, Italy had plans under way to attack Trieste, the Austrian Adriatic port.

Rumania Crushed. Rumania joined the Allies in August, 1916. Immediately after war was declared, Rumanian armies invaded Transylvania. They seized and strengthened mountain passes in the Carpathians. Austria-Hungary was in no position to fight back because of its severe defeats by the Russians. Germany and Bulgaria therefore were assigned to punish Rumania. Un-

der Von Mackensen and Von Falkenhayn, their armies swept straight through to the Black Sea. They captured Bucharest in December, and seized about half of Rumania, with rich resources in oil and wheat.

On Other Fronts. In Armenia, Grand Duke Nicholas conducted a successful Russian campaign; capturing Erzerum, Trebizond, Erzingan, and Baiburt. Turkey made a number of attempts to cross the Syrian Desert and strike at the Suez Canal. Some troops reached the canal, but the British drove them back.

The situation in Greece caused serious concern on both sides. Serbian forces, driven out of their homeland, took refuge on Grecian islands for reorganization, and then were transferred to Salonika. King Constantine of Greece, who was the brother-in-law of the German Kaiser, maintained a show of neutrality. But the group of Greek patriots headed by Eleutherios Venizelos favored the Allies, and joined in fighting against Bulgaria. Greece had been bound by treaty to help Serbia whenever that country should be attacked, but had refused to do so. The Allies therefore put little faith in King Constantine, and, as a precautionary measure, blockaded the Greek coast.

Tanks. A new engine of war, known as the tank, appeared in 1916. The first tank made in the United States was a modified form of the Holt caterpillar tractor, and was made in Peoria, Ill. The motor of the tank was enclosed in heavy armor, with small loopholes for sighting and for machine guns. The first of these clumsy-looking devices were used as an experiment. They terrorized the enemy, but after the first surprise, the Central Powers learned to offset their effectiveness by heavy gunfire, and began to build tanks of their own. Throughout the war, the Allies made far more use of tanks than did the Central Powers. See **TANK, MILITARY**.

The War in 1917

As 1917 opened, the Allies had reason to be hopeful.

The great resources of the Allies were beginning to make themselves felt.

But Germany also had reasons for hope. Its armies held vast stretches of Allied territory. The British blockade was beginning to hurt, but two could play at that game. The German submarine campaign was frightening neutral shippers out of the war zones, and for weeks one out of four British ships that left port never returned. It seemed quite possible that the submarines might starve Great Britain into surrender.

The United States Enters the War. Throughout the early part of the war, the United States had been carefully neutral. But American manufacturers and farmers found both sides eager to buy their goods. Since Great Britain controlled the seas, it was easy to make sure that American goods could go only to the Allied nations. American businessmen did not mind this much, for the Allies were ready to buy all they could produce. But Germany saw the United States as a storehouse of materials for the Allies. By the use of submarines the Germans tried to cut off the flow of supplies to the Allied countries. Many American ships were sunk, and American lives and property were lost. On April 6, 1917, the United States declared war on Germany. But it took many months for the United States to get an army into the field.

During the year, a notable effort toward peace was set in motion by Pope Benedict XV. On August 1 he sent a note to each of the warring powers, suggesting compromises which might end the struggle. The spokesman for the Allies, in reply, was President Woodrow Wilson. He made it clear that the Allies could not make peace with a government they could not trust.

In the West. The great Battle of Verdun ended in 1916, but each side held its ground, and sought for weak points at which to thrust. Nothing was accomplished by either side until August, 1917, when the French attacked on both sides of the Meuse River, and

American Artillerymen Practice Using a French Field Gun as Their French Instructors Look on

Rowan, Black Star



took territory along a front of eleven miles. They won back in three days what the crown prince's army had taken from them in the great six-months' battle the year before.

The most important military operations in the west during the year took place in the northeastern part of France and in Belgium. The British, Canadian, French, and Belgian forces joined in offensives which threatened to destroy German morale in that section. In June the British exploded a series of mines on a ten-mile front at Messines, Belgium, in the most gigantic operation of the kind that had ever been known. This feat and the operations which followed during the next few days drove the Germans back three miles, along a five-mile front.

A little to the south, a vast movement toward Lens was largely in charge of the Canadians. Little by little, they fought their way into the outskirts of the coal city, so that the value of Lens as a producer of coal for Germany was destroyed.

Late in November, British Major General Sir Julian Byng planned and carried out a surprise attack against Cambrai, France. Over a front of thirty miles, the Germans under Crown Prince Rupprecht were pushed back more than five miles, and driven to a desperate defense of Cambrai, with the British only two miles away. Byng lost almost all his gains to a German counterattack.

Russia Drops Out. On March 15, before the spring campaign in the east had begun, liberal Russians overthrew their government, imprisoned the czar in his palace, forced him to abdicate, and declared to the world that Russia was free. The Allies hailed Russia's revolution with joy, for the czar's desire for peace was well known, and the revolutionists had announced that the new government would carry forward the war effort beside the Allies. Russian armies drove the Austrians back in Galicia and threatened them in Poland.

But Russia was in no condition to go on fighting. The Russian armies were short of equipment, hungry, war weary, and could not be held in line. Fighting men laid down their arms in dozens of brigades. In one section of the long front, when the Germans attacked, the Russians even opened the way for their advance.

The Germans tried without success to make a separate peace with Russia. Then in September a German army and over half the navy made a demonstration in the direction of the Gulf of Finland. On the way, they captured Riga, a great seaport, without resistance. Pressing onward, they took Oesel and Dagö islands, commanding the gulf. The way was open to the forts at Kronstadt and to the Russian capital, Petrograd (now Leningrad).

But there was another surprise in the Russian situation. A council of workmen and soldiers overthrew the provisional government in November, and seized power. Those members of the government who were unable to escape were arrested. Between 8,000 and 10,000 persons were killed in a brief reign of terror, while the new forces were gaining control in Petrograd and Moscow. Alexander Kerensky, leader of the provisional government, was able to escape.

The leaders in this second revolution were Nikolai Lenin and Leon Trotsky. The workmen's and soldiers' committee made Trotsky Foreign Minister of

Russia, and gave Lenin, as Premier, autocratic powers. The announced program of this revolutionary government was to make peace with the Central Powers, and to take over all land in Russia and parcel it out to the peasants.

On December 8, the new government brought hostilities to an end, arranged an armistice with Germany to be effective December 17, and entered into peace negotiations. But the Germans demanded for themselves all occupied territory. Trotsky and his associates then refused to make peace, but they also declared they would not continue the war.

Partly with the hope of persuading Russia to continue the war, President Wilson on January 8, 1918, stated to Congress his famous "Fourteen Points." His speech failed to influence Russia, but it clarified the war aims, drew the Allies closer together, and laid the foundation for the peace terms at the end of the war.

In March, 1918, Trotsky signed a humiliating peace at Brest-Litovsk. Germany was given Livonia, Estonia, Courland, and the Åland Islands, and its title to Poland was confirmed. German armies disregarded the treaty and continued their march into Russian territory. Before June they had control of the Ukraine and the Crimea.

Italian Reverses. Italy's campaign against Austria-Hungary made steady progress throughout the summer and early fall of 1917, under the leadership of General Luigi Cadorna. The army's outposts were pushed far northward. Gorizia, an important city, was the center of a broad territory taken from Austria, and Italian lines reached within ten miles of Trieste.

At this point Germany came to Austria-Hungary's rescue. Several army corps and many large guns were quickly transferred from the paralyzed Russian front. The Austro-German attack at Caporetto, which followed in October, won from Italy in three days 1,000 square miles of territory. Italy tried to check the invasion at the Tagliamento River, but failed. Its armies retreated slowly to the Piave River, where they chose to stand and face the powerful foe. General Armando Diaz replaced Cadorna as commander.

Alarmed at the development, England and France hastened to Italy's aid. Before December, heavy reinforcements arrived from the Western Front, and the attack was stopped.

The War in Asia. Near the end of 1915 an Anglo-Indian expeditionary force appeared north of the Persian Gulf. Its objective was Baghdad. In November the British successfully attacked the Turks south of Baghdad. In December they were defeated and driven into Kut-al-Amara, where they were surrounded and besieged. On April 29, 1916, the entire British force of 10,000 men and officers surrendered because of threatened starvation. This was a severe blow to British prestige. Another force, which had tried to relieve the first, captured Baghdad in March, 1917, and pushed on north of the city.

The British army in Asia continued its task of lessening the territory and the influence of the Central Powers in the sultan's territory. By December 1, 1917, it had fought its way to within three miles of Jerusalem, and on December 9, General Edmund H. H. Allenby and



Burton Holmes, Ewing Galloway

American Soldiers in World War I Watch the German Lines from an Observation Post in the Vosges Mountains

his forces captured the city. This was the only great Allied victory in 1917.

The Greek King Abdicates. The situation in Greece remained tense and critical during the first half of 1917. King Constantine was not trusted by the Allies, and he was forced to abdicate on June 12. The throne was given to his second son, Alexander. Alexander favored the Allied cause. He recalled Venizelos to power as Prime Minister, and after that Greece was considered one of the Allied nations. Former King Constantine went into retirement in Switzerland.

Events on Land in 1918

After a winter with no important operations, the Germans prepared an offensive campaign to crush the enemy on the Western Front. The plan was to separate the French and British armies, then to attack the British and completely destroy them. After that the French could easily be defeated. Field Marshal von Hindenburg promised the German people that he would be in Paris by April 1.

Germany's Great Offensive. The great attack began on March 21, 1918, on a front of fifty-one miles, extending from Ypres southward. An attacking force had never before exerted such pressure, and never before had the loss of human life been so great. The Allied armies slowly retreated for ten days, fighting stubbornly.

By April 6, the great attack had been stopped. This result was largely due to the unification of the Allied command under the French General Foch. Before that time, each Allied army had fought independently.

The German armies had taken French territory to a depth of about twenty-seven miles in ten days. Their

advance had been so rapid that they were forced to halt to form their lines again and to bring up heavy artillery. A week later the offensive got under way once more, but the second drive was slowed up in seven days, and the Germans gained only about fifteen miles. Four other drives followed. Then came a brief period of quiet, during which the Central Powers gathered all their strength for an attack on the center of the Western Front.

The Battle for Paris. On May 27 the battle began again. The most active section was the line from the Chemin des Dames, northeast of Soissons, westward through Noyon to Cantigny, and northward to Arras. The weight of German steel and manpower drove the British, French, and Americans steadily back. The great drive also extended westward toward Reims. Another offensive was launched against the British, Belgians, and Americans in the region of Ypres, in a new effort to reach the Channel ports.

The outlook for the Allies was discouraging. Field Marshal Sir Douglas Haig sent out the cry, "We are fighting with our backs to the wall!" Allied newspapers were preparing their readers for the fall of Paris.

The victorious Germans turned their best battalions in the direction of Paris. Between Soissons and Reims, they advanced in a southwesterly direction against the French and Americans. From the Soissons-Reims line, they pushed southward to the banks of the Marne, which they reached May 31. At Belleau Wood, 6,000 of 8,000 American marines were killed, but the line held. Grateful France renamed the spot "the Wood of the American Marines." At Château Thierry, Americans were sent to relieve tired Frenchmen, with instructions to check the progress of the enemy and fall back slowly

to prepared defenses farther in the rear. The Germans savagely attacked the Americans and pushed them back. The American general ordered a counterattack. It was successful and Château Thierry was cleared of the Germans on July 2. Paris was saved, and thereafter the German forces were on the defensive. The steady increase in the number of American troops gave Foch a superiority in numbers which made it possible for him to attack when and where he pleased.

The Soissons-Reims "pocket" was first cleared of German troops, and Château Thierry, at its southern tip, was recaptured by Allied troops on July 21. Then Foch began a series of hammering blows between Reims and the North Sea. The entire line of over 200 miles was one great battle, but there were distinct and savage encounters in several spots. At times five great battles were raging at once. Cantigny, northwest of Montdidier, was the scene of a great offensive by American troops, and its capture was followed by thrusts north and south by the British and French. The German line began to fall back. By August 18, the Allied lines ran south by east from Albert to Soissons, and north from Albert to a line east of Arras, west of Lens and Lille, and east of Ypres.

Meantime, British, Belgians, and Americans, operating near the North Sea, exerted such pressure that Belgian soil was recovered mile by mile. Ostend was entered October 17, and on the same day, Bruges was occupied. On October 19, Zeebrugge, which the Germans had made a great submarine base, was cleared of the enemy.

The Last Days. By August the Americans were holding thirty-nine miles of the French front. Great success had been achieved by pushing ahead along short lines and pinching the Germans into small "pockets," from which they had to retreat to avoid surrender. These tactics were now to be used on a grand scale.

In the north, the enveloping campaign was extending into Belgium. The Allies were driving the Germans south and east, and giving them no rest in the center of the roughly semicircular, enclosing line. The Americans were ordered to push up from the south.

The Drive toward Metz. On September 12, more than 700,000 Americans attacked the Germans at Saint Mihiel. French units were on the flanks. In two days,

the enemy had been pushed back from this triangular area, and the fighting line ran almost directly southeast from Verdun to within two miles of the Lorraine border. Then a grinding campaign began north of Verdun, in the region of the Argonne Forest and along the Meuse River. By October 15, great naval guns of the United States, mounted on railroad cars, were throwing shells upon the forts around Metz, twelve miles away.

Germany's Rapid Collapse. The armies of the Kaiser had been retreating since July. When Valenciennes was taken, the fortress at Maubeuge was threatened. This was the last German stronghold on French soil.

News of the state of affairs was reaching beyond the Rhine, and the German people began to understand that they had been deceived. Bulgaria had surrendered, Austria-Hungary had quit the alliance, Turkey had given up, and Germany stood alone.

The Kaiser placed Prince Maximilian of Baden in the post of Imperial Chancellor on October 3, and gave him the task of seeking an armistice. Socialists were admitted to the Ministry. Within a few days they had control of the government, and President Wilson was informed that a government of the people was ready to discuss peace. The President, in reply, advised Germany that terms of an armistice could be had by applying to the high Allied military command, in the person of Marshal Foch. The emperor left Berlin and sought refuge with his army, but it was a poor place to get support. The Chancellor demanded that the Kaiser abdicate. Von Hindenburg agreed with him and William II had to agree. In the early morning of November 10, he entered The Netherlands to seek safety from his own soldiers.

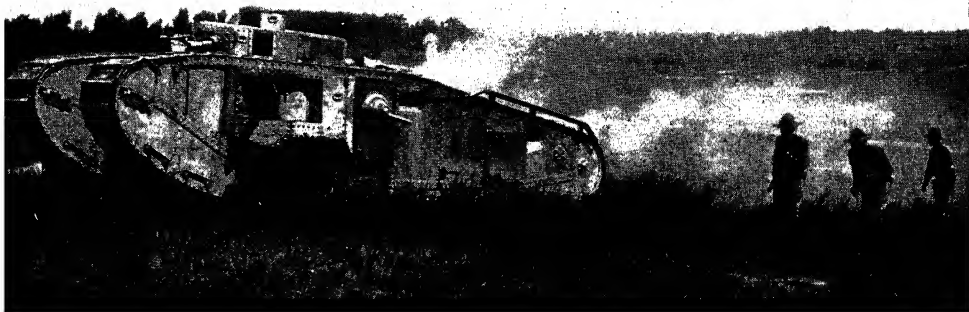
In the meantime, Marshal Foch had given the German government his armistice terms. Seventy-two hours was the time limit for acceptance, and this limit was to expire on Monday, November 11, at 5 A.M. The Germans accepted the terms, and 11 A.M., November 11, was set as the hour when fighting should cease — a day and hour to be long remembered in world history.

The War on the Sea

In July, 1914, just before the war began, the British fleet was massed in a grand review in the English Channel. There were 215 ships in line — the greatest

Soldiers Go through Tank Maneuvers at One of the Great U.S. Training Grounds during the War

Ewing Galloway





The End of World War I was arranged at this historic spot in Compiègne Forest. German officers met Allied officials here

in a railroad car and accepted the terms that brought the fighting to an end on November 11, 1918.

number of fighting vessels ever assembled up to that time. When the war broke out, this fleet was ready for instant and powerful action. It promptly bottled up the German fleet and ended Germany's foreign trade. The Germans made one try to get their fleet out into the Atlantic. This attempt led to the Battle of Jutland, which is described below. It failed, and the great German navy, on which the Kaiser had spent millions of dollars and which was his especial pride, was bottled up within the Kiel Canal and behind the vast mine fields of Helgoland and the great guns of Cuxhaven and Wilhelmshaven. But Germany found another way to make its power felt upon the seas.

A few German torpedo boats and cruisers which were at sea attacked North Sea shipping immediately after the declaration of war. Gradually these enemy vessels, including some submarines, were captured or sunk. After a few months, only the German submarines were feared by Allied and neutral shipping.

Five German cruisers engaged a weaker British fleet off the coast of Chile near Coronel on November 1, 1914. They sank two cruisers and disabled two others. The score was evened on December 8, when another British squadron attacked these German vessels off the Falkland Islands. The *Dresden* alone escaped destruction. The German cruiser *Emden* roamed the oceans for a time, and destroyed shipping valued at nearly \$10,000,000. In November, 1914, an Australian war vessel drove the *Emden* ashore, a blazing wreck, at Cocos Island in the Indian Ocean.

During 1915 and 1916 several German raiders attacked shipping on all the seas. The *Dresden*, *Prinz Eitel Friedrich*, *Karlsruhe*, *Kronprinz Wilhelm*, and *Koenigsberg* deserve special mention. The *Dresden* was destroyed by the British at the Juan Fernández Islands on March 14, 1915. The *Karlsruhe* was sunk in East African waters on July 11. The *Prinz Eitel Friedrich* and the *Kronprinz Wilhelm* took refuge at Newport News, Va., in April, and were interned. The *Goeben* and the *Breslau* bom-

barded African ports on the Mediterranean in 1914, and then escaped through the Dardanelles into Turkish waters.

Battle of Jutland. The greatest naval engagement of the war was fought off the entrance to the Skagerrak on May 31, 1916. Historians generally call it the Battle of Jutland.

The German Grand Fleet, under Admiral Reinhard Scheer, sailed into the open sea to invite battle. It was met by a strong force of Britain's battle cruisers, under Admiral David Beatty. The vessels of the two forces fought nearly all day at a distance of eight to ten miles. Toward evening, the dreadnaughts of the British fleet arrived under Admiral John Rushworth Jellicoe. The Germans withdrew behind their mine fields.

The Germans hailed the battle as a victory, and in a sense it was. The British lost three battle cruisers, three armored cruisers, eight destroyers, 6,094 killed including two rear admirals, 674 wounded, and 177 prisoners. The Germans lost one old battleship, one battle cruiser, four light cruisers, and five destroyers, 2,551 killed and 507 wounded. But the British could afford naval losses much better than the Germans, and Great Britain was still master of the seas.

By the terms of the Armistice, over seventy German war vessels of all classes — from mighty battleships to submarines and destroyers — were delivered to the Allied and associated powers in December, 1918. These were interned at Scapa Flow, in the Orkney Islands, and German crews were left aboard as caretakers. In spite of a close watch, the Germans sank half the interned vessels in June, 1919. They did this only after terms of peace had been definitely arranged.

The German Colonies. British naval forces took possession of Germany's oversea colonies early in the war. In August, 1914, a New Zealand expedition took possession of New Guinea and Samoa. Japan sent a fleet and army against the German fortress of Tsingtau in China, which surrendered after a ten weeks' siege.

The Allies occupied Togoland, in Africa, the only German colony that was self-supporting, soon after the war broke out. British and French forces captured the Cameroons in 1915. General Louis Botha, the South African Premier, organized a force which conquered German South West Africa. Only German East Africa, the largest and richest of the German colonies, held out against the British forces until the end of 1918.

The War in the Air

Airplanes were used for the first time in war in 1914. They were used for scouting — for observing the positions and strength of the enemy, and for taking photographs — but not for fighting. In 1914 the best machines could fly only ninety miles an hour and could carry just two persons.

The airplane developed rapidly, and was soon being used as a fighting craft. Early in 1916 the French Government would accept no plane unless it could go 160 miles an hour in its trial flight, and could carry two men and 800 pounds additional weight. A year later, a speed of 175 miles per hour was possible, and good machines could carry a ton of bombs and machine guns.

Plane motors of 120 horsepower satisfied aviators in 1914. In 1917 double motors of over 200 horsepower each were common, and it was said that one man in the air was worth a thousand men on the ground.

When the war began, there were fewer than 500 planes in Great Britain, France, and Germany. France had the greatest number, estimated at 250, Great Britain the smallest number, believed to be about 90. Almost at once, every country began to manufacture planes. They became the eyes of the artillery. From aloft, the airman began to direct the gunners by wireless. Soon airplanes carried bombs for the destruction of military depots, railroad trains, camps, and ammunition factories. As aviators grew bolder, they flew low and at high speed over enemy lines — sometimes as low as 200 feet above the ground — and sent machine-gun fire into the ranks.

Air battles became common as each side tried to force the enemy out of the air. Before the end of 1917, the Allies had mastery of the air on the Western Front. The fighting in the air was colorful, but it actually played little part in deciding the outcome of the war.

The Zeppelins. At the beginning of the war, the German government placed great reliance upon its zeppelins — cigar-shaped dirigibles 600 feet long, with four motors developing more than 500 horsepower. They were inflated with hydrogen gas, which is highly inflammable, so that they were easily set on fire and shot down. But they were of service to Germany in long-distance bombing raids over England and France.

For the first time since the days of William the Conqueror, London was attacked by forces from overseas when air raids of zeppelins and airplanes began in 1915. These raids went on from May 31 of that year to May 20, 1918. About 355 incendiary and 567 explosive bombs were dropped in the city. These completely destroyed 174 buildings, seriously damaged 617 others, killed 524 persons and injured 1,264, and did damage to an estimated value of about \$10,000,000.

The English and French used fleets of airplanes,

powerful searchlights, and antiaircraft guns against the night raids of the Zeppelins. Late in 1917 the zeppelins began flying so high that gunfire was ineffective against them. The greatest single loss suffered by Germany in these raids was the destruction of five huge zeppelins and the capture of another, in France, when the craft became lost on the return from England. It was said that the six zeppelins destroyed that day made up half of Germany's "superdreadnaughts of the air." With these losses, zeppelin raids ceased.

Submarines in the War

Submarines played an important part in World War I. No effective defense against them was developed during the first three years of the war, and for a time it looked as if they might decide the outcome.

The submarine had one great weakness — it was almost helpless on the surface of the water. For this reason, submarines could not afford to come up and give warning, or take passengers off ships before sinking them. Any enemy vessel in the neighborhood could easily destroy a submarine while such activities were going on. The sinking of the British liner *Lusitania* by a German submarine without warning, on May 7, 1915, resulted in the loss of 1,198 lives, including 128 American citizens. This caused great indignation and contributed to the entry of the United States into the war two years later.

There was some justice in the German claim that the rules of international law were unfair to them. Britain had a great surface fleet and Germany a great submarine fleet. It was easy for the British to stop a vessel, search it for contraband, and take the passengers and crew off before sinking it. All these things a surface vessel could do without risk. But such activities were terribly dangerous for a submarine, and some were impossible.

The "War Zone." Early in 1915, the Germans announced that they would sink any vessel entering a "war zone" that included the waters around Britain, the western coast of Europe, and the Mediterranean. Neutral countries that had been shipping to the Allies could either see their trade ruined or risk the sinking of their ships.

"Unrestricted Warfare." But goods kept flowing to the Allies, and the German Government decided on even stronger measures. On January 31, 1917, it announced that all vessels of any kind bound for Allied ports or returning from them would be sunk. This was the same as saying that the "war zone" was extended to cover the high seas.

The Germans estimated that by destroying as much as 1,000,000 tons of shipping a month they could starve England into surrender in four months. They knew the risk of bringing America into the war, but if their plan worked the war would be over before America could do much. The plan did not work.

Defense Measures. Many devices were used to destroy submarines. Great steel nets were stretched across the English Channel to protect shipping between Great Britain and France. Depth bombs were dropped over the spot where a submarine had submerged. Ships used a kind of underwater kite called a *paravane* which was

IMPORTANT EVENTS OF WORLD WAR I

1914			March		
June	28	Archduke Francis Ferdinand of Austria assassinated at Sarajevo.	June	25	Revolution forces Czar Nicholas of Russia to give up his throne. First United States troops land in France.
July	28	Austria-Hungary declares war on Serbia.	July 31-November 10 Third Battle of Ypres.		
August	4	Germany invades Belgium.	October 24-December 26 Italians driven back and defeated at Caporetto.		
September	5-10	First Battle of the Marne.	November	7	Bolsheviks seize control of Russia.
September	11	Germans end retreat at Aisne River line.	November	20-December 3	Battle of Cambrai.
October	19-November 21	First Battle of Ypres.	December	9	British capture Jerusalem.
October	10	Antwerp surrendered.	December	17	Russian armistice with Germany.
1915			1918		
February	18	Germany begins submarine blockade of British Isles.	January	8	President Wilson announces Fourteen Points.
April 22-May	25	Second battle of Ypres; first use of poison gas in warfare.	March	3	Russia signs Treaty of Brest-Litovsk.
April	25	British land in Gallipoli.	March 21-April 6	Third Battle of the Somme.	
May	7	Steamship <i>Lusitania</i> sunk off Irish coast.	May 27-June 6	Third Battle of the Aisne.	
June-September		Russians driven back on Eastern Front.	June	6-25	Battle of Belleau Wood.
October	3-5	Allied forces land at Salonika.	July	21	Allies recapture Château Thierry.
1916			September	12-16	Battle of St. Mihiel.
January	7-8	British withdraw from Gallipoli.	September 26		Battle of Meuse-Argonne begins final German retreat.
February 21-September 3		Series of battles in Verdun area; Germans finally driven back.	September 29		Bulgaria surrenders.
May	31	Battle of Jutland.	October	30	Turkey accepts armistice terms.
July	1-13	Battle of Somme.	November	1	Hungary and Austria become separate republics.
July	15	First use of tanks in warfare.	November		Austria accepts armistice terms.
July 14-September 3		Second Battle of Somme.	November		Revolution begins in Germany.
December	6	Germans capture Bucharest.	November		Kaiser William II abdicates.
			November 11		Germans sign armistice.
1917			1919		
February	1	Germany begins unrestricted submarine warfare.	June	28	Treaty of Versailles signed.

towed by a long wire. The paravane carried a charge of high explosives, which would blow up anything it struck. Most effective of all were the speedy vessels known as "submarine chasers." But only 203 German submarines were destroyed during the entire war.

To escape submarines, ships used smoke screens to conceal their movements. *Camouflage*, or deceptive painting, was used to confuse submarine crews as to the course and speed of a ship. Zigzag courses were often steered through submarine zones. Merchant ships, instead of sailing separately, were gathered into fleets of thirty or forty vessels and the whole fleet was convoyed and protected by warships. For all that, the Germans sank 6,604 vessels totaling nearly 13,000,000 tons in the course of the war. Great Britain suffered the heaviest losses, with Norway second.

The failure of the German plan was due largely to the speed-up of shipbuilding in Great Britain and America. The British merchant shipping losses amounted to 7,759,000 tons, but new ships were built to make up 4,342,296 tons of this loss. The United States built merchant ships much faster than the Germans could sink them, and had 4,196,000 more tons of shipping at the end of the war than at the beginning.

The United States in the War

When the United States entered World War I, most Americans took it for granted that their share in the war would be to provide money, munitions, and ships. They expected the American navy to play a part in

the war, but few expected to see American troops go to Europe. It soon became clear that they were mistaken. The Allies needed everything, but most of all they needed men.

The Draft. In May, 1917, Congress passed a Selective Service Act. All men between the ages of 21 and 30 had to register for military service. The age limits were later changed to 18 and 45. Thirty-two training camps were hastily built, chiefly in the South. When the Armistice was signed, more than one fourth of the men in America between 18 and 31, a total of about 3,665,000, were in the armed forces. There were 1,993,000 men overseas, and 1,672,000 in the service in the United States.

Financing the War. The United States had to find money not only to pay the costs of war but also to help the Allies. Taxes and loans were the only methods for raising the money. Five huge bond issues were floated, the first four known as "Liberty Loans" and the last as the "Victory Loan." These loans raised a total of \$21,448,120,300.

The income tax was raised sharply, and so were taxes on liquor and tobacco. An "excess profits tax" took 20 to 60 per cent of profits above the average for the years 1911 to 1913. "Nuisance taxes" were placed on such things as theater and railroad tickets, telephone and telegraph messages, club dues, and many other "luxuries." Postage for a letter was raised from two cents to three. A total of \$11,280,000,000 was raised by taxation. Altogether, the United States Government spent a total

of \$35,413,000,000 during the years of World War I.

Public Opinion. Not all Americans had been in favor of entering the war. Many agreed with Senator Robert M. La Follette, who said, in voting against the war resolution, "Germany has been patient with us." Some went as far as the Socialist Morris Hillquit, who charged "The country has been violently, needlessly, and criminally involved in war."

To unify American opinion, the President named George Creel to direct the work of a Committee on Public Information. This committee set out to sell the idea that America was wholly right in the war and Germany entirely wrong. It did its work well. The slogans "Make the world safe for democracy" and "A war to end war" were on everyone's lips. Outstanding critics of the war got long prison sentences. Hundreds of conscientious objectors were jailed.

War Boards. Six great wartime agencies undertook to change the country's economic life to fit the needs of war. The United States Shipping Board, set up the year before the war broke out, tried hard to get ships built faster than the Germans could sink them. The Food Administration, under Herbert Hoover, tried to sell the idea of saving food by setting up "meatless" and "wheatless" days and by preaching the "gospel of the clean plate." It also helped to increase wheat production by raising prices. A Fuel Administration handled the problems of coal and oil production and use. A Railroad Administration took over the railroads and ran them as a single system. A War Trade Board controlled foreign trade to make sure that no American goods got to the enemy. A War Industries Board under Bernard Baruch took charge of American industrial production. These six "war boards" were responsible only to the President.

The Navy. The United States Navy got into the "fighting war" many months ahead of the army. The first group of American destroyers had crossed the Atlantic within a month after the United States entered the war. American naval forces did not try to operate separately, but became practically part of the British Grand Fleet. American ships were used against neutrals to enforce the blockade against which America had earlier protested so violently.

For the most part, American ships were used to hunt down the deadly submarines and to convoy merchant ships through dangerous waters.

The A.E.F. The Allies demanded soldiers so urgently that the United States government changed its plans for training men. It was decided to send partly trained and partly equipped troops to Europe, and finish the training job there. The first troops of the American Expeditionary Force, under General John J. Pershing, began to arrive in France toward the end of June, 1917.

From the first, General Pershing insisted on a separate American army. The Allies wanted to use American troops to fill up the ranks in their own armies, but Pershing was firm. In October, 1917, the American army began to take over part of the battle line. Before the war ended, they held a fourth of the line — more even than the British held.

Americans in Battle. The American Expeditionary Forces engaged in thirteen battles, most of them important. American forces were at the front for 200 days, in

small numbers at first, and increasing rapidly until 1,993,000 were fighting.

The chief battles in which Americans took part were the Meuse-Argonne, in which 1,200,000 Americans were engaged for forty-seven days, Belleau Wood, in which 8,000 marines achieved glory, Château Thiery, which stopped the Germans in their drive for Paris, the second Battle of the Somme, and Saint Mihiel, in which the Americans wiped out a German salient held since 1914. There were also many minor engagements.

Not all the American fighting was done in France. An American regiment was sent to Italy in July, 1918, and in October two divisions were lent to the French for use in Belgium.

Europe after the War

The terms of the Armistice left Germany dismembered, disarmed, and under constant guard. The principal terms of the Armistice included the following demands:

Withdrawal of German troops from Belgium, France, Alsace-Lorraine, and Luxembourg.

The surrender of all German arms and ammunition, warships and submarines, and most of the railways and rolling stock, including all railways and equipment in Alsace-Lorraine.

The immediate return of all Allied prisoners.

Withdrawal of all German troops from the west bank of the Rhine River, with the east bank declared a neutral zone.

Withdrawal of German troops from occupied territory which had belonged to Russia, Rumania, and Turkey.

Withdrawal of German troops from East Africa. Payment by Germany for damage done by its troops in invaded territories, the return of cash taken from the national bank of Belgium, and the return of gold taken from Russia and Rumania.

After the German high command signed the armistice, British forces established themselves in northern Germany, with headquarters at Cologne. The American armies moved across to Coblenz, and the French forces occupied Mainz. From these three strategic points, the Allies could command all of the Rhine country at their back, and also the bridgeheads to the east for a distance of twenty miles. Thus there was established a new "Watch on the Rhine" that was not completely lifted until 1930. Meanwhile, the Allies prepared for setting the final peace terms in the Versailles Treaty. See VERSAILLES, TREATY OF.

Loss of Man Power. The following, except for the United States, are approximate figures of the losses of the Allies and the Central Powers during the war:

	TOTAL CASUAL- TIES	DEAD	WOUNDED	PRISONERS OR MISSING
	Allies			
Great Britain	3,200,000	908,375	2,100,000	191,600
France	4,510,000	1,385,000	2,675,000	450,000
Russia	8,765,000	1,765,000	4,500,000	2,500,000
Italy	3,725,000	475,000	950,000	1,300,000
Belgium	90,000	20,000	60,000	10,000
United States	307,092	81,553	221,059	4,480

TOTAL CASUAL- TIES	DEAD	WOUNDED	PRISONERS OR MISSING
Central Powers			
Germany 6,325,000	1,750,000	3,800,000	775,000
Austria*			
Hungary 4,495,000	900,000	2,850,000	745,000
Turkey and Bulgaria 1,928,000	538,000	1,250,000	140,000

Feeding Starved Europe. Before the war-wrecked countries of Europe could begin to be self-supporting by their own agriculture and industry, the victor nations had to send supplies and food to prevent millions from starving. The United States performed a large part of the service of food supply under the direction of Herbert Hoover, who later became President. He had been United States War Food Administrator during the conflict. Following the war, Hoover directed the allocation of food to various parts of Europe during the period of reconstruction. S.B.F.

Related Subjects. The reader is also referred to:

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Albert I	Earl of
Allenby, Edmund H. H.	Lawrence, Thomas E.
Baker, Newton D.	Lenin, Nikolai
Baker, Ray S.	Lloyd George, David
Beatty, David	Ludendorff, Erich F. W.
Bernstorff, J. H., Count von	March, Peyton C.
Bethmann-Hollweg, T., von	Mitchell, William
Byng, Julian H. G.	Moltke, Helmuth von
Carrel, Alexis	Nicholas (II, Russia)
Cavell, Edith L.	Orlando, Vittorio E.
Clemenceau, Georges	Pershing, John J.
Constantine I	Pétain, Henri Philippe
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Foch, Ferdinand	Rickenbacker, Edward V.
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Gerard, James W.	Venzelos, Eleutherios
Haig, Douglas, Earl	William (II, Germany)
Hindenburg, Paul von	Wilson, Woodrow
Hoover, Herbert C.	York, Alvin C.
Jellicoe, John R.	Zeppelin, Ferdinand,
Joffre, Joseph J. C.	Count von

ORGANIZATIONS

American Legion	Gold Star Mothers, American
American Legion	can
Auxiliary	Red Cross

TREATIES

Rapallo, Treaties of	Trianon, Treaty of
Saint Germain, Treaty of	Versailles, Treaty of
Sèvres, Treaty of	

UNCLASSIFIED

Airplane	Fiume
Alsace-Lorraine	Gallipoli
Armistice Day	Mandated Territory
Baghdad Railway	Merchant Marine
Bomb	Neutrality
Camouflage	Paravane
Chemical Warfare	Poison Gas
Codes and Ciphers (History)	PT Boat
Comanche	Saar
Convoy	Stars and Stripes
Daylight Saving	Submarine
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Unknown Soldier
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Questions

- What was the total money cost of World War I?
- How many men lost their lives in this struggle?
- What incident began World War I?
- What was the meaning of "Drang nach Osten"?
- How did this policy lead to the war?
- What was the plan of the German General Staff at the beginning of the war?
- Where were the three great battle lines of the early days of the war?
- What was the "Salonika Fiasco"?
- What new engine of war was first used in 1916?
- In what year were airplanes first used in warfare?
- When and why did the United States declare war on Germany in World War I?
- How many men did the United States have in the army at the end of World War I? How many of these were overseas?
- In what principal battles did United States soldiers fight in Europe during World War I?
- What country lost the most men in World War I?
- About how many German men were killed in the war?

WORLD WAR II



WORLD WAR II. The twenty years between the time the Versailles Treaty was signed on June 28, 1919, and the time Germany invaded Poland in September, 1939, were more like an armed truce than a period of peace. Some historians believe that both wars were part of the same war, with only a breathing spell between. Both wars had some of the same general causes — nationalism, fear, economic rivalry, large armaments, and propaganda. But there were some differences. World War I was chiefly a political war, a struggle for empire and power. World War II was a political war, but it was also a struggle between two basic philosophies of life — democracy and Fascism. World War II was a struggle to keep alive the liberties which Americans and Europeans had fought for more than 200 years to achieve. It was a battle against men who wanted to make all other men the servants of a superstate ruled by a self-styled “Master Race.”

World War II was fought on every continent and every ocean. Most of the peoples of the earth took part in it. It was a total war, in which the civilian was as likely to be attacked as the soldier, sailor, or marine. Civilians were killed in air raids, and they died in concentration camps. The fighting countries worked at feverish speed to develop new means of destroying one another. Near the end of the war, two new weapons appeared — the rocket missile and the atomic bomb. Neither weapon won the war, but each served to warn the world that another war might mean the complete destruction of our civilization.

President Franklin D. Roosevelt called World War II a “war for survival.” One of the main results of the war was a growing feeling among men that all wars must stop if the human race is to survive.

Between the Wars

Historians do not agree on the date when World War II began. Some consider the Japanese seizure of Man-

churia in 1931 and 1932 as the real beginning of military operations. These historians call the Italian invasion of Ethiopia and the Spanish Civil War parts of World War II. Other historians date the beginning of the war from Japan's invasion of China on July 7, 1937. Warfare on a continental scale certainly began at this time, although Japan and China did not formally declare war on each other. Many persons date the beginning of the war from September 1, 1939, when Germany invaded Poland. Great Britain's and France's declarations of war two days later were the first formal recognition of the conflict which had been going on for almost eight years and which had its roots in the Versailles Treaty of 1919.

The League of Nations. The statesmen who made the Versailles Treaty tried hard to make sure of peace in the future. They set up a League of Nations to help nations settle disputes. They also decided to disarm Germany, and after that to cut down the armaments of their own countries.

After the League was created, it did some good work in settling disputes between small countries. But the United States refused to join, and this fact greatly weakened the League. (See LEAGUE OF NATIONS.) Germany was disarmed. But when it came to disarming themselves, the victorious nations moved very slowly and did very little.

German Resentment. The Versailles Treaty was not harsh as peace treaties go. But Germany had a hard time after the war, and the Germans found it easy to blame their nation's troubles on the terms of the Versailles Treaty.

The Weimar Republic, set up in Germany in 1919, was connected in German minds with the hated peace settlement. Workers who could find no jobs drifted more and more into the Communist and National Socialist parties. These parties hated each other, but both wanted to overthrow the republic.

Lost Opportunities. Great Britain and France might have saved the Weimar Republic by granting some of its requests. But both countries had troubles of their own, and gave little attention to Germany's problems. The German people soon decided that the Weimar Republic was weak and could do nothing for them. This attitude, along with unemployment and discontent, helped Adolf Hitler in his rise to power.

Invasion of Manchuria. In 1931 another good chance to strengthen world peace was lost. Japan, without declaring war, began military operations against China. The League of Nations could have shown its strength by cutting off trade with Japan and perhaps by stronger action. But the League did nothing but investigate the situation and formally condemn Japan. Some nations then decided that the League would not protect them if they were threatened, and began building up armaments to defend themselves. Other nations decided that they could follow Japan's example and use force against their neighbors without fear of League action.

France Refuses to Disarm. In 1932 Chancellor Heinrich Brüning of Germany saw that his government was in a bad spot. Germans were coming to believe that they could get fair treatment from the other nations only by regaining their military strength. With strong nations all around them, many Germans wanted to rearm as quickly as possible. This the Government refused to do. But it was only a matter of time before the people of Germany would vote the German Government out of power.

Brüning thought his people would be satisfied if the other countries would also begin to disarm. Great Britain, Italy, and the United States were willing, but France refused to discuss the question. Some historians say this was the turning point that headed Europe toward World War II. Brüning's government fell from power, and in six months Adolf Hitler was Chancellor of Germany.

Invasion of Ethiopia. In 1935 the Italian dictator Benito Mussolini seized Ethiopia. Once more the League of Nations took only weak action. In most countries, this was the end of respect for the League. In the following years, Mussolini and Hitler sent troops and supplies to help General Francisco Franco overthrow the legal government of the Spanish Republic and set up a Fascist dictatorship. Most persons expected that the League would take no action, and it took none.

Hitler's Early Aggressions. As soon as Hitler became Chancellor, he set to work to make himself dictator. By lies and brutal force, his Nazi followers changed Germany from a democratic republic to a totalitarian state, with Hitler as dictator.

Hitler had given a clear blueprint of his plans in his book, *Mein Kampf*, which was published in 1925 and 1926. But European statesmen had not paid any serious attention to the book. Hitler's program was to disregard the Versailles Treaty, to build up Germany's armaments, to bring under his control as many Germans as possible no matter where they lived, and finally to rule Europe.

At first Hitler had to move carefully. Poland and Germany had been enemies for 600 years, and Poland was in close alliance with France. Hitler wanted to make sure that he would be safe from attack on his east-

ern frontier while he was building up an army, so he made a ten-year treaty of friendship with Poland in 1934.

Hitler speeded up Germany's rearmament. On March 16, 1935, he felt strong enough to declare that Germany was going to begin requiring a period of military service from all German men. The Treaty of Versailles limited Germany to a professional army of 100,000, but Hitler soon had an army of 600,000 men. The European countries protested, but did nothing more.

There was a general feeling that there was some justice in Germany's demand for greater equality in armaments. Great Britain felt that a mistake had been made in not granting concessions to Germany earlier. This was probably true, for a few concessions might have satisfied the German people and strengthened the peace party in the Weimar Republic. But Hitler's government was different. Yielding to Hitler seemed only to encourage him to demand more. In June, 1935, Britain consented to scrap the naval clauses of the Treaty of Versailles, and Hitler signed a treaty limiting the size of the German navy to 35 per cent the size of the British navy.

Remilitarization of the Rhineland. On March 7, 1936, in violation of the Versailles Treaty, Hitler suddenly sent German troops into the districts west of the Rhine River. This action brought the German army to the French frontier. Many French statesmen wanted to warn Hitler that France would use force unless German troops were withdrawn from the Rhineland. If the French had used force, they would probably have succeeded for many of Hitler's high officers were opposed to his move. But French use of force might also have led to a general war, and Europe shrank from that risk. So Hitler won again and became more confident.

Japan Attacks China. Japan had been taking over economic power in north China since the seizure of Manchuria. Finally, in 1937, the economic invasion became a military one. Fighting broke out on July 7, after a Japanese-inspired incident at the Marco Polo Bridge near Peiping. The fighting soon spread to most of China. The European powers and the United States did little to stop the conflict. Some countries gave a little aid and sympathy to China, but most countries continued to sell war supplies to Japan.

Seizure of Austria. The union of Austria with Germany had been forbidden by the World War I peace treaties, although many Germans and Austrians favored such a union. But Hitler's persecutions of minority groups caused Austrian Catholics, Jews, and Socialists to oppose a union with Germany. Hitler quieted their suspicions by declaring: "Germany has neither the wish nor the intention . . . to annex or unite with Austria."

His acts soon showed that he had been lying. He secretly encouraged and supported a revolutionary Nazi movement in Austria which resulted in the assassination of the Austrian Chancellor, Engelbert Dollfuss. Kurt Schuschnigg, who replaced Dollfuss as Chancellor, got a lesson in Hitler's methods. On one day Hitler held out the hand of friendship, and on the next he bullied and threatened. All the while he worked to build up the Nazi party inside Austria. Finally, in March, 1938, Hitler massed troops on the Austrian frontier and demanded that Schuschnigg resign. Then he marched in

and annexed nearly 7,000,000 Austrians to the Third Reich.

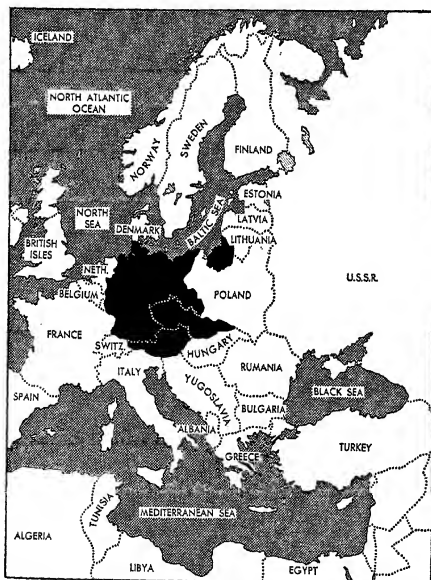
Such men as Anthony Eden and Winston Churchill in England saw the dangers, and spoke words of warning. But Eden was dropped from the British Cabinet, and Churchill's warnings went unheeded. Nothing was done to stop Hitler.

The Westwall. Hitler's seizure of Austria greatly alarmed the Czechs. The seizure left their country surrounded on three sides by Nazi territory. And inside their mountain frontier was a discontented minority of 3,500,000 Sudeten Germans whom Hitler wished to annex to the Reich.

During the summer of 1938, Hitler had nearly 500,000 men working at frantic speed to complete the Westwall, or Siegfried Line. This mighty fortification of steel and concrete was intended to protect the Reich against France.

Munich. When the Westwall was nearly ready, Hitler demanded that the Sudeten Germans should come under his rule. The Czechs were ready to fight to prevent the breaking up of their country. A European war threatened. The British Prime Minister, Neville Chamberlain, made three flights to Germany for personal interviews with Hitler. Hitler promised that the Sudetenland would be his last territorial demand in Europe.

At the time, British and French air forces were very weak compared with those of Germany, and could not give much help to the Czechs. So Chamberlain and Édouard Daladier, the Prime Minister of France, put pressure on the Czechs to yield to Hitler's demands. The result was the Munich settlement of September 30, 1938. By the terms of this agreement, the Sudetenland, on the edge of Czechoslovakia, was ceded to Germany.



Germany (in Black) before the Invasion of Poland 1939. Czechoslovakia had already been annexed.

Three weeks later, Hitler secretly demanded that the Poles hand over the city of Danzig and a strip of land across the Polish Corridor. The Poles feared that this would be only the first of several such demands, and made no definite reply.

Six months later, on March 15, 1939, after violent press and radio attacks against the Czechs, Hitler took over the rest of Czechoslovakia. Slovakia was allowed to become a petty state under German control. Poland was given Teschen and the surrounding territory, and Hungary was allowed a strip along southern Slovakia and the Carpatho-Ukraine. By Hitler's action the twenty-year-old Czechoslovakian republic was wiped out.

On March 21, Hitler seized Memel from Lithuania. He also forced Rumania to agree to a five-year commercial treaty. Under this treaty, Rumanian grain would be exchanged for German arms and machinery. German businessmen would develop Rumanian oil and minerals and build railroads, factories, and highways in Rumania.

"Stop Hitler." These annexations and broken promises convinced Great Britain and France that Hitler meant to control eastern Europe. They knew by now that his word was worthless. They could not know how far his ambitions might lead him. But they felt that the time had come to check him. The Munich policy of appeasement had proved a tragic failure.

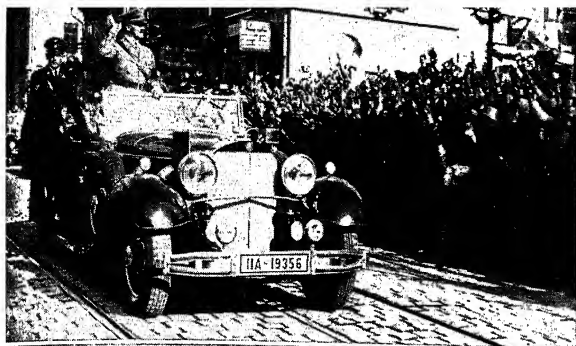
When Hitler again asked Poland for Danzig and a pathway across the Polish Corridor, Chamberlain announced that Britain would support Polish resistance. Chamberlain also asked France, the Soviet Union, and other states to form a "Stop Hitler Front." Great Britain and France made frantic efforts to build up their air forces and other armaments.

Hitler complained that Chamberlain's guarantee to Poland was encouraging the Poles to be unreasonable. German newspapers talked about the "frightful maltreatment" of the German minority in Poland. On April 28, 1939, Hitler declared that he no longer regarded as binding either the German-Polish treaty of friendship of 1934 or the Anglo-German naval agreement of 1935.

To offset Chamberlain's defensive English-French-Polish combination, Hitler announced on May 22 that Germany and Italy had signed an alliance. Each promised all possible military assistance to the other in case of war. During the summer, conflicts between Germans and Poles in Danzig and along the frontier became more threatening. Bitter attacks in the newspapers and over the radio whipped up strong feeling on both sides.

Soviet-German Pact. For months Joseph Stalin had been carrying on negotiations with the British and French and with the Germans. On August 23, the Soviet Union finally signed a nonaggression pact with Hitler, promising not to fight against Germany.

Invasion of Poland. Hitler ordered his troops to invade Poland at dawn on September 1, 1939. On September 3, Great Britain and France announced that they were at war with Germany. Canada, Australia, New Zealand, and the Union of South Africa joined Great Britain in declaring war. Eire announced neutrality, and India asked for independence from Great Britain as the price of full co-operation in the war.

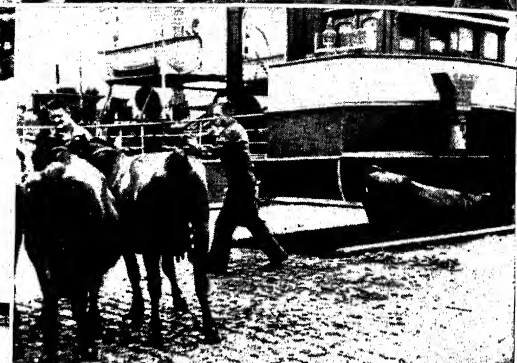
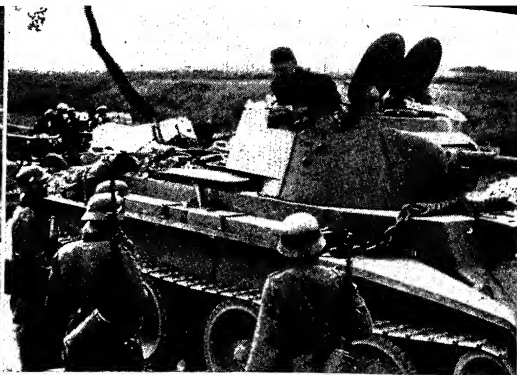


EVENTS LEADING TO WORLD WAR II

Top left: Adolf Hitler on his triumphal tour of the newly acquired Austria, in 1938. *Second left:* Neville Chamberlain, England's Prime Minister, at Munich in September, 1938. *Lower left:* Hitler takes over the rich Sudetenland. *Above:* Mussolini and Hitler, active heads of the Rome-Berlin Axis. *Below:* Stalin and Ribbentrop look on as Premier Molotov signs the Russo-German nonaggression pact in 1939.

Photos: Acmee; Interphoto; International News



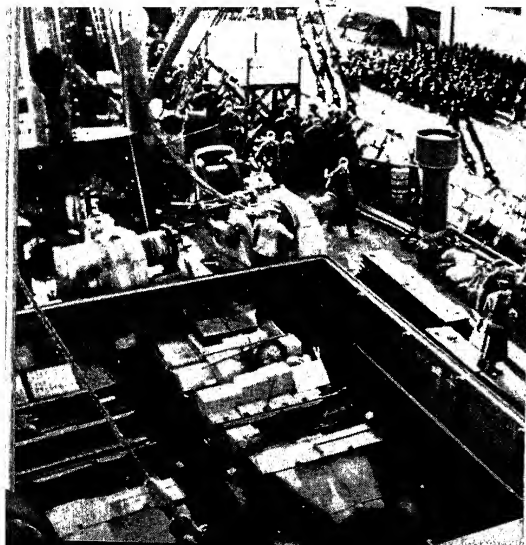


THE INVASION OF POLAND AND THE NEUTRAL COUNTRIES

Top left: Destruction in Warsaw. *Top right:* Russian and German soldiers meet in Poland. *Above left:* Finnish ski troops in action against Russia. *Above right:* Shipping Danish cattle to Germany. *Below left:* A German transport

which carried troops and supplies to Norway. Note that the trucks in the hold are loaded and ready to set out as soon as they are landed. *Below right:* French reinforcements for the Norwegians. *Bottom right:* Nazi troops in Norway.

Photos: Bryan-Pix; Interphoto; Acme; International News; European



The War in Europe

Germany was far better prepared for war than was either Great Britain or France. Hitler had been building up his war machine since he first came to power. His air force was small, but it was a model of efficiency and flexibility. In addition, Hitler had ground troops that were well balanced in armored and infantry divisions. The air forces of Great Britain and France were small and largely out-of-date. The manufacture of military aircraft in France and England was on only a small scale in 1939, and the American aircraft industry had not yet gone into large-scale production. The British and French armies were large, but not so well trained as the German army. Both the British and French lacked adequate armed forces. Only on the sea did the Allies have superiority. Even here their superiority was not complete. The German submarine force was large and effective.

Blitzkrieg in Poland. The greatest strength of the German forces lay in their careful planning and smooth co-ordination of all types of fighting men and equipment. Their method of warfare was new and terrifying to the Allied world. It was the *blitzkrieg*, or *lightning war*. With this method, the Germans needed only four weeks to conquer all Poland. The Poles had a plan of defense. Polish forces were divided into three main armies. One protected the central borders and the Polish Corridor. Another protected southern Poland. A third army was massed along the borders of East Prussia. But the Germans struck so swiftly that the Poles had no chance to carry out their plans of defense.

German planes swept over Poland, destroying the planes and bases of the weak Polish air force, bombing railroads and bridges, and cutting communication lines. Polish civilian refugees were bombed and machine-gunned, so that they fled in blind terror and created confusion in the rear ranks of the Polish armies. Swift-moving German tanks and motorized forces cut through and behind the main Polish armies. Within a few days, the rich industrial and mining regions of southern Poland were either in German hands or cut off from the Polish armies. This move robbed the Poles of most of their supplies.

On September 17, Soviet forces invaded Poland from the east, and quickly occupied about half of eastern Poland. Thus, the Polish troops were trapped between two fires. The city of Warsaw put up a heroic but useless battle. It did not surrender until September 27, after nearly three weeks of ceaseless bombing and shelling. The next day, Germany and the Soviet Union signed an agreement on the division of Poland.

Germany annexed the Polish Corridor, Danzig, Posen, and a wide strip of territory east of Silesia. The rest of the country, centered about Warsaw, was placed under a Nazi governor and was called the "General Government of Poland." Poles in the German areas were either sent as slave laborers to Germany or transferred to the General Government area. Jews were killed outright or were forced into the Warsaw ghetto, where most of them were later murdered.

The Polish Government escaped to France and later

set up a government in exile in London. Some Polish refugees continued to operate the Polish naval vessels which evaded the German forces. Other refugees formed Polish units which later fought in Europe.

"Sitzkrieg" in the West. There were no great battles along the Western Front during the first seven months of the war. At first the Germans were busy in Poland. Later they moved their air force to the west and maintained their positions along the Westwall, or Siegfried Line. Neither the British nor the French had been able to offer the Poles any aid.

During the first seven months of the war, a few French patrols raided German territory in the Saar Valley. Most air action was limited to photographic flights or the dropping of propaganda pamphlets. Newspapers spoke of the strange period as the "phony war." The Germans called it a "*Sitzkrieg*," or *sitting war*, because the Germans sat in the Siegfried Line, while the French sat in the Maginot Line.

Invasion of Norway and Denmark. Norway and Denmark had great value to Germany. Planes based in Norway would be about 200 miles closer to England than they would be if based in Germany. Norwegian ports would give the German navy bases for operation in the North Sea. Denmark could furnish bases to protect the entrance to the Baltic Sea. Both countries could also provide much food. Through Norwegian ports, the Germans could import needed Swedish iron ore.

At dawn on April 9, 1940, two German destroyers entered the Norwegian port of Narvik and torpedoed two Norwegian gunboats. After them came German ore boats in which German troops were hidden. The Germans occupied Narvik before the Norwegians knew what was happening. Other surprise landings were made at Trondheim, Kristiansund, Bergen, and Stavanger. Another large German force slipped into Oslo harbor. The Norwegian King Haakon and his government barely escaped from Oslo in time to avoid the Germans. The government finally made its way to England.

A large number of Nazi agents formed a "fifth column" which greatly speeded the Norwegian conquest. Some Norwegians, led by Vidkun Quisling, also helped the Germans. Quisling was rewarded by being named head of a puppet Norwegian Government.

At the same time that the German forces were invading Norway, they also invaded Denmark in a series of surprise moves. They occupied the country without much resistance. King Christian was made a prisoner in his castle and remained the legal ruler of his country. But the Germans actually controlled Denmark. Denmark was forced to supply Germany with food and other products, but was better treated than most other countries under Nazi rule.

Allied Failure in Norway. After their first surprise, the Norwegians began to fight the Germans in their snow-covered mountain valleys. Great Britain and France sent expeditionary forces to Norway. A British force retook Narvik. Other British troops landed above and below Trondheim and tried to cut German communications in the area. But they lacked supplies and

men and had to withdraw from Trondheim on May 2 and 3, and on June 9 they left Narvik.

Invasion in the West. The Allied failure in Norway caused much dissatisfaction among the Allies. In Great Britain, Prime Minister Chamberlain was forced to resign, and Winston Churchill took his position. In France, Paul Reynaud followed Daladier as Premier. In the confusion caused by these governmental changes, Hitler struck once more with his blitzkrieg machine. This time his target was The Netherlands, Belgium, Luxemburg, and France.

On May 10, 1940, without warning or declaration of war, German troops invaded the Lowlands. Nazi planes bombed the main Dutch and Belgian air bases, and paratroops captured many important positions. Fifth columnists seized bridges to keep them from being blown up. Motorcycle troops dashed ahead of the main forces to keep The Netherlands' dikes from being broken.

The German plan of attack was much the same as the famed Schlieffen plan which nearly succeeded during the first weeks of World War I. The plan was to sweep like a wheel in a wide arc through the Lowlands and south into France. The hub of the wheel was in Luxemburg. The Germans did not want to try to break the French Maginot Line, but they hoped to get around it from the northwest. Their plan succeeded.

In five days The Netherlands was overrun. Queen Wilhelmina escaped to England with her government. On May 14, the commander of the Dutch army ordered his forces to cease fighting.

Tiny Luxemburg, which had no army, was overrun in a single day. The Grand Duchess Charlotte fled to France and later to the United States.

On May 10, the Germans captured the Maastricht Bridge and crossed the Albert Canal at several points in Belgium. Parachutists took the Eben Emael Fortress, one of the main points of the defenses of Liège. French forces under General Henri Giraud reached the Dutch-Belgian border, but had to begin to fall back on May 15.

The Collapse of Northern France. Meanwhile, another arm of the German forces had captured Sedan at the north end of the Maginot Line, and had invaded France. They began pouring great numbers of men across the Meuse River. These forces turned westward and moved rapidly across northern France to the Somme River and the coast. Nazi planes repeated the same tactics they had used in Poland. Stuka dive bombers bombed and strafed refugees along the highways.

The German westward drive cut off the Belgian and Allied forces in Belgium from the main body of the Allied forces. On May 18, Premier Paul Reynaud of France reorganized his cabinet to include Marshal Philippe Pétain, World War I hero, as Vice-Premier. General Maxime Weygand replaced General Maurice Gamelin as Allied commander in chief. Weygand tried to break through the German lines to re-establish communications with Belgium, but he failed. On May 28, King Leopold surrendered the Belgian Army and allowed himself to be taken prisoner.

Dunkерque. The Belgian surrender left the British and French forces in Belgium in a desperate situation. They retreated to Dunkerque on the northern coast of

France. Here they held off the Germans while more than 300,000 troops waded out to British rescue-vessels. The tiny British air force formed an aerial to keep off German bombers. The successful c at Dunkerque meant that Great Britain still army. If the Dunkerque rescue had failed, the British army would certainly have been defeated or captured. The rescue gave the British people new hope, a the army was badly disorganized and was without equipment.

Italy Enters the War. By June 5, the Germans had made secure their hold on the Lowlands and northern France. On that day they launched a new offensive, directed against the French army. Within four days the French forces were in hopeless retreat. Mussolini now decided that the war was nearly over and that it was time for him to get a share of the spoils. So on June 10, the Italian Government informed Britain and France that Italy would enter the war at midnight. Italian forces, however, did little but invade a small part of the Riviera coast of southern France.

France Gives Up. On June 11 the French Government moved to Tours, and then to Bordeaux. The Germans entered Paris on June 14. After that the Germans moved south through western France without any opposition. They took the Maginot Line from the rear.

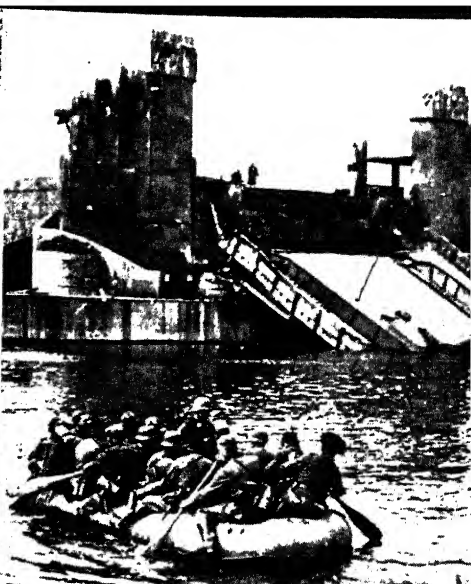
The French Government was in a state of indecision. One group wanted to move to North Africa to continue the war from there. Winston Churchill offered to unite Great Britain with France under one flag. But a new French government under Pétain decided to surrender. On June 22, 1940, France signed an armistice with Germany in the historic railway car in the Compiègne Forest, where Germany had surrendered to the Allies in 1918. The armistice divided France into two zones. The occupied zone was to be governed by a German military government. The unoccupied zone, in southern France, was left under Pétain, who set up his capital in Vichy. The French fleet was left in French hands but was ordered to stay in French ports.

"Free France." Many Frenchmen fled to North Africa and Great Britain. General Charles de Gaulle took over the leadership of the French refugees. He set up the headquarters for his group in London, and called his organization "Free France." The organization played a great part in later warfare.

The Battle of Britain

The fall of France left Great Britain in an extremely serious situation. The British had no allies, and a victorious Germany was in control of the continent. The Germans began to boast that they would be in London by August. They began to lay plans for an invasion, and collected barges, landing craft, and troops in French channel ports. But they hoped they could force Britain to surrender by bombing, and without an actual invasion.

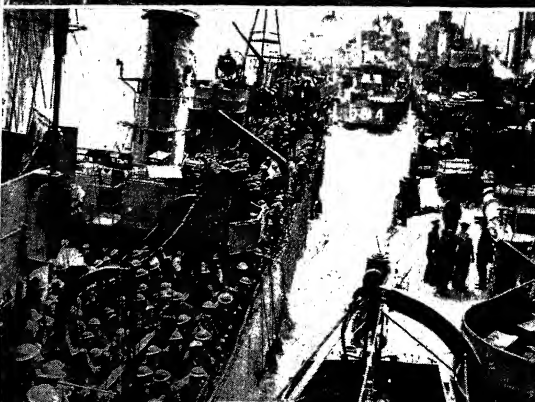
In July, German bombers began to blast English cities and ports. These raids were light compared with the raids which the Allies made on Germany later in the war. But the British were so open to attack that the raids seemed very bad. Britain's small force of fighter planes was finally able to force the Germans to give



INVASION OF THE LOW COUNTRIES

Top left: Belgian soldiers fleeing from the enemy. *Top right:* German soldiers crossing a river in The Netherlands in a collapsible rubber boat. *Above:* German guards parading through The Hague after its fall. *Right:* Driven from France by Hitler's Blitzkrieg, hundreds of thousands of Allied troops fled by any means possible. Soldiers are pictured here as they waded out to a British warship, sent to carry them to safety. The evacuation of Dunkerque was one of the world's greatest military feats. *Below:* French troops being rescued from Dunkerque in British ships. *Lower right:* A motley group of British ships arriving in England with troops rescued from the German trap at Dunkerque.

Photos: International News; Interphoto; Black Star; Acme



WORLD WAR II

up daytime attacks. The Germans then switched to night raids. But the British had developed radar to the point where it could be used effectively. The Germans finally found that night raids cost too much in men and planes lost to pay for the damage they could cause. By the middle of 1941, the Germans had given up trying to bomb Great Britain into surrender. And by this time, British strength had been built up so that an invasion was too much of a gamble for Hitler to undertake.

Britain's greatest danger lay in being shut off from supplies. Threats to the British supply lines included air attacks on shipping near England, magnetic mines planted in English harbors and in the English Channel, and the constantly growing German submarine warfare. In September, 1940, the United States gave some help to Great Britain. The British received fifty American destroyers in return for leases granted to the United States on British bases from Newfoundland to Trinidad. The setting up of the Lend-Lease program in March, 1941, also helped the British. The invention of *degaussing* helped protect vessels from magnetic mines. But the danger to Atlantic shipping continued for many months.

The War Spreads

Two New Fronts. Italy's share in the Axis attack was to open two new fronts. The first was in Africa. In the summer of 1940, troops under Marshal Rodolfo Graziani pushed eastward from Libya into the Egyptian desert. But in January, 1941, the British pushed the Italians back into Libya as far west as Bengasi.

The second Italian effort was an attack on Greece, which began in October, 1940. The Italians had occupied Albania in April, 1939. They now attacked Greece from their bases in Albania. But the Greeks surprised the world by pushing the Italians back into Albania and taking about one fourth of that country. A little later, British troops also drove into Italian Somaliland and Ethiopia and added to Mussolini's troubles.

The Germans Take the Balkans. Meanwhile, Hitler had brought Hungary, Rumania, and Bulgaria under his control by threats and swift, almost bloodless occupations. The Yugoslav government also decided to sign with Germany, but the Yugoslav people supported young King Peter in a revolt against his pro-Axis ministers. The Germans invaded Yugoslavia and in twelve days completely destroyed the organized Yugoslav army. Many disorganized troops fled to the mountains where they fought in small groups to offer resistance from time to time.

Fall of Greece. From Yugoslavia, Hitler was able to help Mussolini by invading Greece. In nine days the Germans took Salonika and Thermopylae and pushed on to Athens. Greek resistance ended, and the Germans handed the country over to Italy.

The British had withdrawn 60,000 troops from Africa to fight in Greece. After the Germans conquered Greece, about 45,000 British troops escaped by sea, some to Egypt and some to Crete. Then the Germans conquered Crete in a surprise invasion by parachute troops, and wiped out the British forces there.

North Africa. While operations were proceeding in Greece and Crete, a German army under Marshal Erwin Rommel had secretly gone to Africa. This heavily

WORLD WAR II

motorized army was called the *Afrika Korps*. It attacked the British in Libya in April, 1941, and in two weeks had recovered all the territory which the British had won from the Italians. In addition, Rommel drove into Egypt. But the Germans could not protect Italian Somaliland and Ethiopia. These fell to Allied troops in the spring of 1941.

The War in Eastern Europe

From the time they signed their nonaggression treaty in 1939, Germany and the Soviet Union were uneasy and suspicious partners. The Soviet Union had shown its suspicions about Hitler's true intentions by strengthening its western borders. Late in 1939 the Soviets had made a number of demands on Finland, which the Finns refused to grant. On November 30, the Red Army invaded Finland. The Finns had the sympathies of much of the Allied world, and they fought valiantly. But they could not hold off the Soviets, and on March 12, 1940, they signed a peace treaty. Under its terms, the Soviets were given most of the Karelian Isthmus, as well as other strips of territory along the Finnish-Soviet frontier. In July, 1940, the Soviet Union occupied the Baltic states of Estonia, Latvia, and Lithuania, and made them part of the Soviet Union. The Soviets also forced Rumania to give up the province of Bessarabia on June 27, 1940.

Invasion of the Soviet Union. On June 22, 1941, Germany suddenly invaded the Soviet Union. For five weeks, the Germans drove back the Red Army with the speed it had shown in earlier blitzkriegs. Most of the world expected the Soviet Union to collapse as quickly as had the other nations of Europe which Germany had invaded.

In the fall the German drive slowed, but the Nazis continued to gain ground steadily throughout the next three months. At the end of November, German troops were only forty miles from Moscow, the Soviet capital. Part of the Soviet government and all foreign embassies in Moscow were moved eastward to Kuibyshev. The Germans had also partly surrounded Leningrad, conquered all of the Crimea except Sevastopol, and captured the great industrial city of Rostov.

But Soviet resistance had been growing in power. Suddenly, in December, 1941, the tide turned. The Red Army in the south began a smashing counterattack. The Soviet troops drove the Germans from Rostov and threatened to cut off the Germans in the Crimea. They took back the Donets Basin, an area which was rich in coal and many other minerals.

Soviet Resistance Tactics. Hitler apparently believed that he could defeat the Soviet Union within a few weeks, or at most, in a few months. But he seemed to forget one important historical fact — that the Russian people have always had a deep love for their fatherland. The German invasion united the Soviet people, and encouraged them to make enormous efforts at resistance. The Soviets carried out a "scorched-earth" policy in the regions conquered by the Germans. Everything of value was destroyed. Factories, dams, and railroads were blown up. Food supplies were burned.

Guerrilla warfare was another problem for the Germans. Bands of Soviet troops and civilians caught be-

THE FALL OF FRANCE

Below: Nazi soldiers occupying a fort in the Maginot Line already wrecked by German guns and air bombs. *Right:* In this historic railway car, at Compiègne, France, the Germans read to the leaders of defeated France the terms of surrender laid down by their Fuehrer, (third from left) while he looks on.

Photos: Pix; International News



Right: On his trip to Paris soon after its fall, Adolf Hitler visited the tomb of Napoleon, the famous French ruler, who also tried to conquer Europe—and failed. *Below:* In 1940, German troops marched through the streets of Paris for the first time since the year 1871.

Photos: International News



hind the German lines went right on fighting. They hid in forests, grainfields, or villages, and attacked German rear bases and lines of communication.

The Germans had also counted on seizing the great Soviet industrial regions of the west and south, and thus depriving the Red Army of supplies. But the Soviets stripped many factory cities of their equipment, and moved machinery to safety in the Ural Mountains and other regions far to the east. With growing aid from Britain and later through Lend-Lease supplies from the United States, the Soviets were able to supply their armies.

Another enemy on which Hitler had not counted was the Russian winter. The same bitter cold which had helped bring about the downfall of Napoleon's Grand Army in 1812 and 1813 almost brought defeat to Hitler in the winter of 1941 and 1942. The Germans lacked proper winter clothing, and the cold froze their mechanized equipment and made it useless.

Other Effects of the Soviet Campaign. Hitler's attack on the Soviet Union had quick results elsewhere. It drew German bombers from attacks on Great Britain and on Atlantic shipping. At the same time, Germany was using up its supplies at a far greater rate than expected.

Nazi control in the occupied countries of western Europe was weakened by the Soviet invasion. Troops had to be removed from those countries to fight on the Eastern Front. Revolts, sabotage, and guerrilla warfare broke out in the occupied countries.

The 1942 Offensive. Through the winter and well into the spring of 1942, the Soviet troops slowly pushed

city of Sevastopol surrendered, and the Germans gained full control of the Crimea. South of Moscow, the Germans began a heavy tank attack along a wide front. By late July they had cut the railroad lines from Moscow to Rostov. This blow threatened to cut the Soviet army's line of supply from the oil fields of the Caucasus.

At Voronezh the Germans divided into two main forces. One force moved south and east toward the oil fields. The other and larger force crossed the Don River and in late August attacked Stalingrad, an important industrial city on the Volga River.

The defenders of Stalingrad fought heroically through months of hand-to-hand street fighting. Finally, on January 18, 1943, they broke the siege of the city, and on February 2, 1943, they drove the Germans from Stalingrad. They surrounded the huge German army attacking the city, and cut it off from the rest of the German troops.

Stalingrad was the turning point of the war in the Soviet Union. Hitler's generals had warned him to shorten his lines before winter set in, but he had refused. Now a vast German army was encircled by Soviet troops. The Germans still hoped for rescue as planes attempted to bring them supplies. Food and munitions ran low, but Hitler urged his troops to hold on. At last their plight was hopeless. The remnants of the army surrendered late in February.

The German people learned only slowly of the great losses at Stalingrad. But the news spread rapidly throughout the German army, and the army's faith in Hitler was shaken.

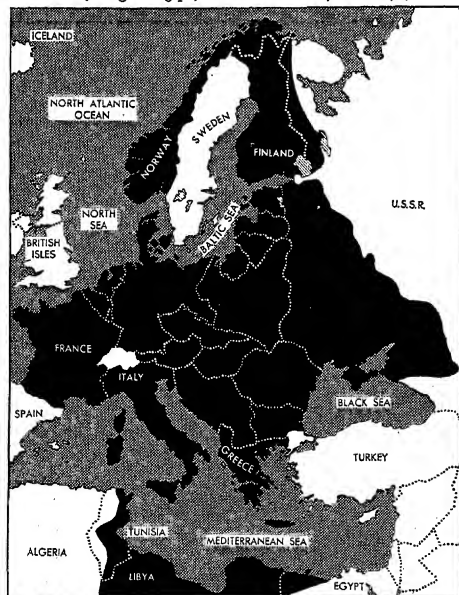
The North African Front

During the summer of 1942 the German Afrika Korps drove deep into Egypt with the aid of the Italian army. For a time Alexandria and Cairo were threatened, as well as the Suez Canal beyond those cities.

But in the fall of 1942, the tide of battle turned against the Germans. On October 23, the British Eighth Army under General Sir Bernard Montgomery attacked Rommel's forces at El Alamein. The strength of the British attack drove the Germans and Italians back in disorderly retreat. By the end of November, the British had reached El Agheila on the Gulf of Sidra. From there they rolled on to Tripoli, and finally to southern Tunisia.

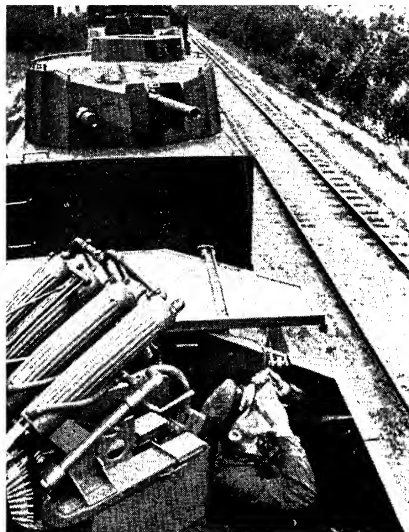
The Landing in North Africa. The British advance in northwestern Africa was greatly aided by the appearance of United States forces. During the first months after the United States entered the war, American forces had been unable to take much active part in the actual fighting in Europe or Africa. Some bombers and many troops went to England, and the Atlantic Fleet took over much of the task of convoying ships. But most of the first year of the war was spent in building up American forces.

These forces made their first large-scale appearance on November 7 and 8, 1942. Troops landed along the Atlantic coast of Morocco at Safi and Fedala, and on the Mediterranean coast of Algeria at Oran and Algiers. A fleet of about 500 merchant ships, escorted by about 350 warships, had brought the United States forces from the British Isles and from America. American paratroops were flown to Africa from England. General



At the Height of Their Military Success the Axis Powers — Germany and Italy — controlled the area shown in black.

the Germans back. But in May, 1942, the Germans began another great offensive. On July 1, the Crimean



THE INVASION OF RUSSIA

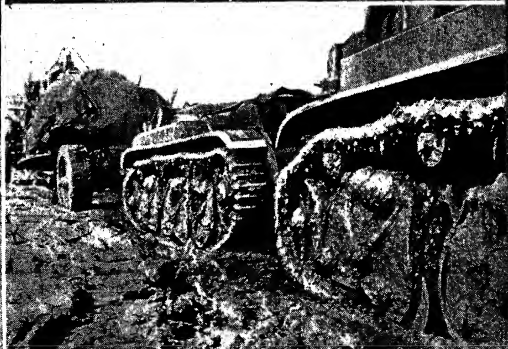
Armed forces and civilians alike put up a fierce resistance when Russia was invaded by Germany in 1941. Armored trains, *left*, were used to fight land and air forces. Women took an active part, *above*, in throwing up barricades and trenches for the defense of Leningrad. Students became members of first-aid squads, *second left*; and farmers and workers, *below*, waged guerrilla war behind the German lines.

Photos: International News; British-Combine



As a result of the Russians' scorched-earth policy, advancing Germans were deprived of food and other supplies, *right*. When compelled to retreat on the Finnish battle front, they laid land mines, which the Finnish soldiers sometimes detected by using an electromagnetic indicator, *below*. During the rainy season, mud became Russia's ally in slowing the advance of German tanks, *lower right*.

Photos: Acme; International News



Dwight D. Eisenhower commanded the expedition. The Allies wanted to make the invasion as completely American as possible, so British troops did not land until after the Americans.

The Allies had made elaborate preparations to take French North Africa with as little fighting as possible. Allied diplomats had plotted with French patriot groups in North Africa. The American General Mark Clark had been landed in Africa from a submarine to plan with French military leaders. General Henri Giraud, who had escaped from a German prison camp, was brought to Gibraltar to work with Eisenhower.

At first the French resisted the attack, especially at Casablanca. But on November 12, Admiral Jean Darlan, the Vichy French military leader who was in Casablanca at the time of the attack, ordered French forces to cease firing. Allied forces moved rapidly to take all of French North Africa. They were able to seize all Morocco and Algiers and to enter western Tunisia. But they lacked the men and equipment to take all Tunisia before the Germans rushed up reinforcements.

Effects of the African Invasion. The first German reaction to the African landings was to sweep down through unoccupied France and take over the entire country. The Germans tried to capture the main French fleet at Toulon, but the French managed to scuttle and sink about fifty of the vessels.

The invasion of North Africa led to quarrels among various French groups. At first, Admiral Darlan was given command of French forces. But he was assassinated on December 24, and the French Imperial Council chose General Giraud to take his place. General De Gaulle objected to this choice since he wanted the post himself. President Roosevelt finally achieved some grudging co-operation between the two French leaders at the Casablanca conference in January, 1943.

The War in the Mediterranean

Naval Warfare. The Mediterranean Sea was Britain's life line. Loss of control in the Mediterranean meant that the sea lanes to the British empire in the Far East would be nearly doubled in length. Italy's entrance into the war in June, 1940, gravely threatened the British hold on the Mediterranean. Immediately after the French surrender, the British tried to get the French fleet to join the British fleet. But the French ships at Oran refused, and on July 3, 1940, French and British ships fired on one another. Several French ships were sunk.

The Italian navy still remained a threat to the Allies. Many Italian ships had been sunk or damaged in air attacks on Italian naval bases. The major blow came at the battle of Cape Matapan on March 29, 1941. In this battle, most of the Italian surface fleet was put out of action. But Italian planes and aircraft continued to operate effectively, and destroyed many British ships. Repeated Italian air attacks on Malta made this base almost useless as a protection to British shipping lanes.

The Middle East. The Axis powers tried to take over the Middle East in order to cut off the British from their oil resources there. An Axis-encouraged revolt succeeded in Iraq, and Vichy French troops ruled Syria and Lebanon. In June, 1941, British forces invaded Iraq and

overthrew the German-sponsored government. Shortly after that, British and Soviet forces took over Iran and removed the *shah*, or ruler, who had Axis sympathies. This move guaranteed the safety of the Allied life line with the Soviet Union through the Persian Gulf. Free French and British troops also took over Syria and Lebanon. Saudi Arabia immediately became sympathetic to the Allied cause. The Middle East was never again seriously in danger of Axis control.

Victory in Africa. In the late winter and early spring of 1943, Allied forces strongly attacked the Axis forces in Tunisia. The British moved from Libya and attacked from the south. Other Allied forces attacked from Algiers. Increased Allied air strength made it difficult for the Axis forces to get supplies. On May 12, the Axis forces in Africa surrendered. This left Africa entirely in Allied hands.

Invasion of Sicily. The Allies moved swiftly to take advantage of their African victory. The small islands of Pantelleria and Lampedusa were conquered by air attacks. On July 10, 1943, a large force of United States, Canadian, and British troops landed in Sicily. A whirlwind Allied campaign captured the island by August 17.

On September 3, Allied troops landed in southern Italy and took the ports and naval bases of Taranto, Brindisi, and Bari. On September 9, American troops landed at Salerno. In bloody fighting, Allied troops joined together across the "toe" of Italy and by October 1 had entered Naples.

Meanwhile, the Fascist Grand Council forced Mussolini out of the premiership of Italy on July 25, 1943. Mussolini was made a prisoner, but was later rescued by German paratroopers. He went to Germany and then returned to northern Italy to form a shadow government. Marshal Pietro Badoglio followed Mussolini as Italian premier. On September 8, by an armistice agreement signed five days earlier (September 3), the Italian army and navy surrendered to the Allies. Shortly afterward, Italy was made a "co-belligerent" with the Allies, and later furnished some men and supplies to aid Allied forces.

The Italian campaign moved forward slowly after the fall of Naples. The land north of Naples was mountainous, and the German defenses were good. Early in 1944 the Allies reached a line about seventy miles south of Rome, where they remained throughout the rest of the winter. On January 22, 1944, the Allies made an unsuccessful attempt to break through to Rome. Allied troops landed at Anzio and Nettuno halfway between Rome and the main Allied lines. But the Germans were able to hold the Allies to a small beachhead.

Rome and Florence. In a mighty attack in May, 1944, the Allies pierced the German lines and raced northward. Heavy air attacks during the winter had reduced German supplies, and the Germans fell back swiftly. On June 4, Rome was taken without heavy fighting and the Allies continued their northward advance. Florence was taken after fairly serious fighting on August 4. Throughout August the Allies continued to move to the north. Finally they were stopped at the German line of defense called the Gothic Line, which stretched across the base of northern Italy.

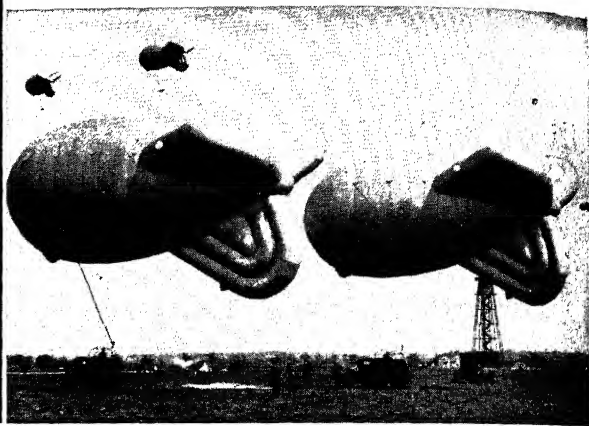
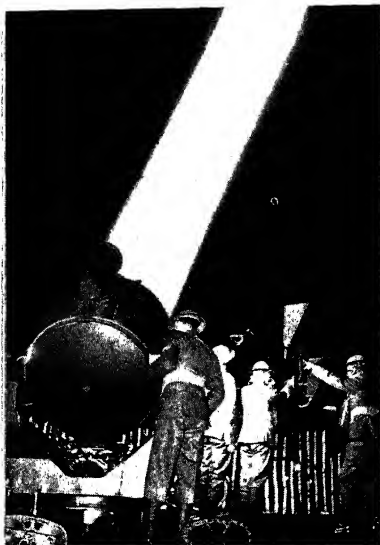


NORTH AFRICA AND SICILY CAMPAIGNS

Top left: A British sailor and United States Rangers on one of the hundreds of transports taking troops to North Africa. *Top right:* American troops landing near Oran, in French North Africa, on November 8, 1942. *Second left:* A British dispatch rider in the mountainous country of Algeria. *Above center:* American engineers removing Axis mines near Gafsa, Tunisia. *Above right:* A group of Axis prisoners, captured by Allied troops, marching to the docks in Algiers before embarking. *Left:* An Arab stationmaster in North Africa, and his friend in native costume, direct British soldiers. *Below:* A part of the great allied invading fleet on its way to Sicily.

Photos: British Combines; Aemo

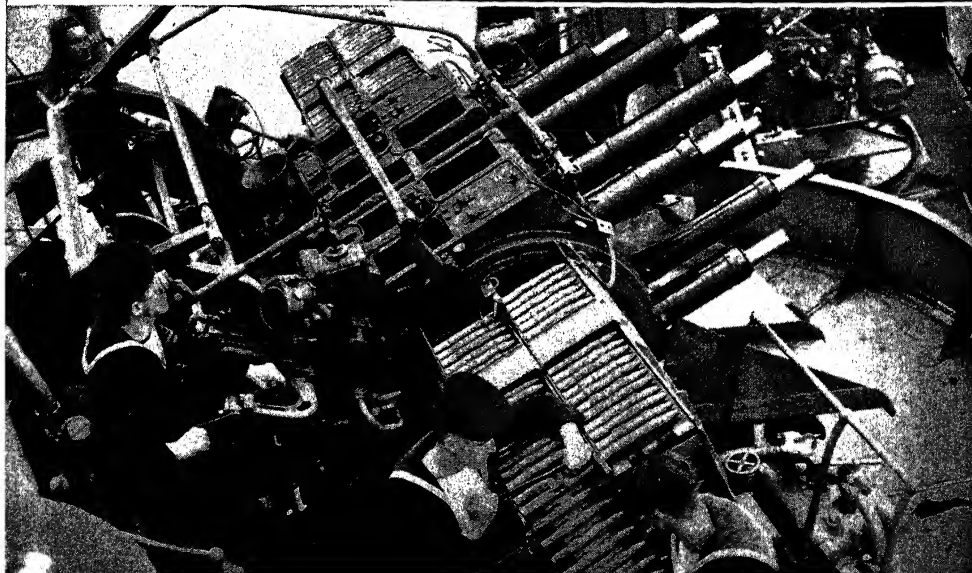
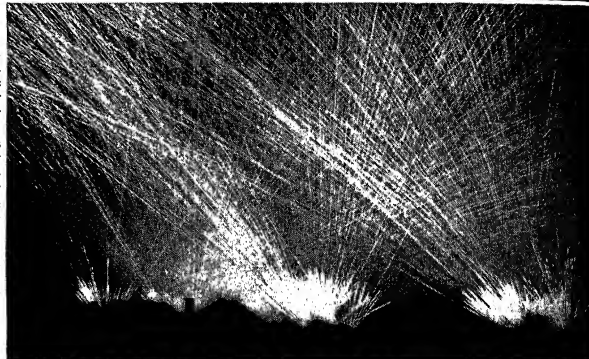


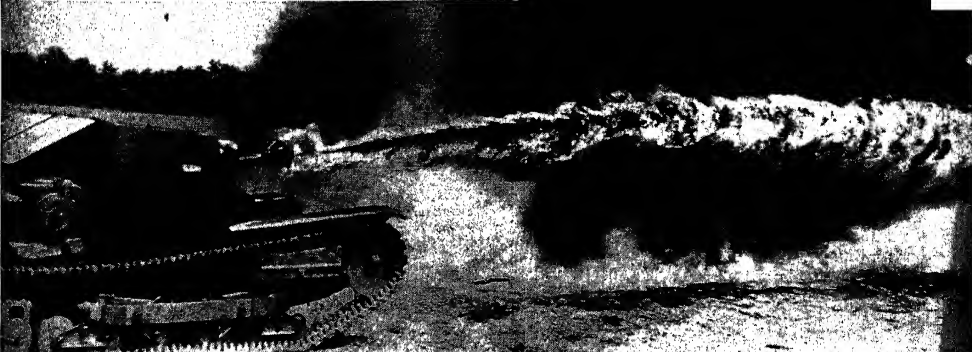


MODERN METHODS OF WAR

Above: British soldiers at a listening post. Several stand at the detectors, ready to catch the sound of any German plane that may be flying above them. Another English soldier operates a powerful searchlight, constantly sweeping the sky in search of enemy aircraft. *Upper right:* Both the English and the Germans use huge barrage balloons to prevent enemy bombers from flying low over important military objectives. These enormous "floating elephants" are filled with hydrogen and are flown from the earth or from ships to which they are anchored by strong, but light, steel cables. *Right:* According to the Germans, British bombers must fly through this barrage of anti-aircraft tracer shells to reach Berlin. *Below:* British sailors load their pom-pom guns for action against attacking German planes.

Photos: Globe; European; Pix; Acme





Upper left: Dropping parachute troops at strategic points behind the enemy lines is a new development of World War II. *Second left:* German soldiers, landed by parachutes, pick up a machine gun, dropped in a similar way, and start out to attack the enemy. *Above:* Small but efficient portable radios enable troops to keep in constant touch with headquarters. *Third left:* Modern tanks can not only travel over rough country but also ford rivers without difficulty. *Below:* During the invasion of France and the Low Countries, the Germans used flame-throwing tanks.

Photos: Pix; International News; Acme; Dever-Black Star

The Battle of the Atlantic

Germany's submarine campaign under Admiral Karl Doenitz became an ever-increasing menace to Atlantic shipping in 1942. The "wolf pack" attack by groups of submarines caused heavy losses of Allied convoy ships, as well as heavy losses of supply ships.

But Allied scientists finally found a combination of weapons to defeat the German submarine. Allied planes first heavily attacked German submarine bases and plants which were building new submarines in Europe. Then a new type of Allied ship, the destroyer escort, was designed, and large numbers of them were built. The development of radar and the improvement of underwater sound devices also greatly aided the detection and destruction of submarines. Finally, the completion of many escort carriers gave the Allies complete aerial patrol of Atlantic shipping lanes. By the spring of 1943, the serious menace of German submarines had been overcome. Submarines continued to threaten and do some damage. But in the last two years of the war, the number of German submarines sunk by Allied vessels far exceeded the number of Allied ships sunk by German submarines.

The German surface navy never seriously challenged the British command of the Atlantic Ocean. The German surface navy was small and could not operate over long distances. In May, 1941, the German dreadnaught *Bismarck* ventured into the North Atlantic and sank the British battleship *Hood*. After a long chase the British navy finally sank the *Bismarck*. The battle cruiser *Admiral Graf Spee* tried to raid British shipping in the South Atlantic, but was cornered and scuttled off Montevideo in South America. Other German ships made occasional raids from Norwegian ports, but the most effective use of the German fleet was as a threat which forced many British ships to stand constant guard.

The Battle of the Air in Europe

At the beginning of the war the German *Luftwaffe*, or air force, was much larger and more effective than the Allied air forces. But the *Luftwaffe* was designed and built for a specific purpose—to work closely with the German ground forces in a blitzkrieg campaign. The Germans were ahead of the Allies in mass production of aircraft. But their plants were geared to build aircraft that would be useful in invasion attacks.

After France fell, the German air force had to turn to another kind of task, that of tactical bombing of England. Because of the long distance German aircraft were not able to carry enough bombs to be of effective use in such a task. The heaviest raid on England was that on Coventry, on November 15, 1940. In this raid, German planes dropped only 200 tons of bombs. Before the war ended, the Allies had dropped about 363 times this number of bombs on Berlin alone.

It took the Allies several years to build up their air forces. They built the same types of planes, fighters, and dive bombers which the Germans had used successfully in battle. But the Allies concentrated their chief efforts on building huge bombers which could carry great bomb loads over long distances. United States plants also built aircraft that could fly at very high altitudes.

In 1940 the British began small-scale aerial attacks on Germany. They slowly built up their forces until, by 1942, air raids were a daily affair. During 1942 and 1943, most American aircraft were sent to Africa, although the United States Eighth Air Force, based in Britain, made its first European raid on August 17, 1942.

The British favored the strategy of "saturation bombing." They preferred to drop a large load of bombs in the general area of the target with the belief that enough bombs would hit the target to destroy it. With this method, they could do most of their bombing at night, and thus avoid the heavy losses of daytime attacks.

The American Air Force preferred the method of strategic bombing, in which targets were hit in "pin-point," highly accurate, bombing. Generally, such bombing had to be done from high altitudes by daylight.

Throughout 1943, the United States Eighth Air Force in Great Britain grew steadily. By 1944 it had assumed tremendous size. It was soon possible for the Allies to send as many as 1,000 planes at one time over a German city. The main aims of the Allied bombing campaign were the following:

To destroy the German air force so that Allied bombing could continue without interruption.

To break up German communication lines and disorganize German civilian existence.

To destroy the most important German war industries.

The Allies had largely accomplished their first aim by the late months of 1944. The destruction of German planes on the ground and in the air, together with the destruction of German aircraft factories, greatly reduced the *Luftwaffe's* strength.

German railroads were repeatedly attacked. Low-flying light bombers destroyed bridges and blew up locomotives. Heavy bombers tore up railroad yards. The chief attacks on transportation came just before and after the Allied landings in France. They greatly aided the Allied advance.

Allied air attacks almost entirely destroyed whole German cities. Such destruction greatly hindered German war production, and lowered German morale.

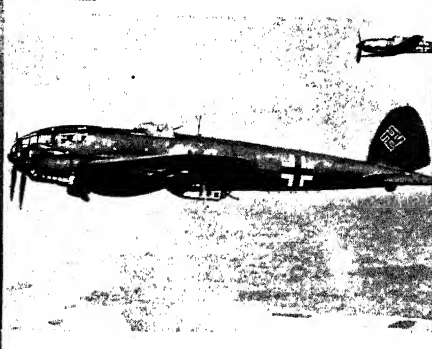
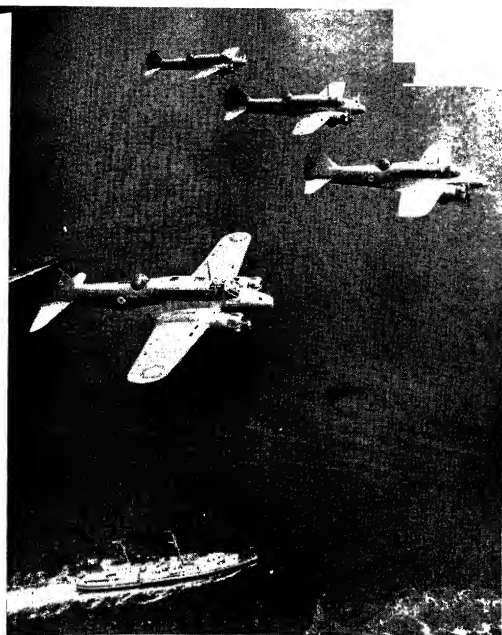
The Allied destruction of German industries was elaborately planned. An effort was made to knock out key plants in the various industries, rather than to destroy entire industries. For example, the destruction of dams in the Ruhr River valley deprived many industries of their source of power. The destruction of the ball-bearing industry slowed down the production of many kinds of machinery. Aircraft production was impeded by the destruction of plants which made essential aircraft parts. The blasting of refineries robbed the German armed forces of vital oil and gasoline.

The Allied air attack on Germany was very costly. By the end of the war, the number of Allied airmen who had been killed was higher than the total of all Allied personnel killed on the ground from the time of the invasion of Normandy to the time of the surrender of Germany. The United States Air Force alone dropped more than 1,500,000 tons of bombs on Europe, and destroyed almost 30,000 German planes on the ground and in the air.

THE WAR IN THE AIR

Left: A squadron of Royal Air Force reconnaissance planes soars in aerial convoy over a British steamer. Britain's all-important supply of food and war materials—and, perhaps, her very existence as a nation—largely depends upon the safe arrival of such merchant vessels.

Photo: Acme



Above: In the foreground, a death-dealing Heinkel-Jager bomber, such as is used in raiding England; in the background, a fighter plane, also belonging to the Nazi air force. Note the swastika on the tail of the bomber.

Photo: Acme

Right: Nazi soldiers loading a bomb on one of their country's Stukas, in preparation for an attack on England. *Lower right:* An English Bomb Disposal Unit lifts a 1200-pound time bomb from its crater in the grounds of a London hospital. One man is removing the fuse, an extremely dangerous and nerve-wracking operation. *Below:* The ruins of an English ship which was struck by German aerial bombs. It lies in a Belgian port, where it was completely burned out after the attack.

Photos: European; British Combino; Black Star



WORLD WAR II

The Secret War in Europe

Underground activities played a large part in the war in Europe. During the early part of the war, the Germans used fifth column groups effectively in making attacks on the various invaded countries. These groups worked inside the country to destroy the morale of the country and aid the German cause. But once these countries were taken, the German agents, or fifth columnists, became less valuable. The Allies, in turn used their agents to further the Allied cause.

After the German invasion of the Soviet Union, the number of German occupation troops in Europe was cut. This cut allowed the people of occupied countries to become more active in their operations against the Germans. Groups of underground workers sprang up in France, Belgium, The Netherlands, Denmark, Norway, Yugoslavia, and to some extent, in the Balkans. These groups were made up of local patriots who hated the Nazis. The actions of the underground included blowing up railroad trains and bridges, slowdowns and sabotage in factories, distribution of illegal newspapers, rescue of Allied air personnel shot down over enemy territory, and gathering of military information.

Allied secret agents also operated in Germany. The agents gave the Allies much information about Germany, especially about the work of German scientists. Information about German experiments resulted in the Allied bombing of laboratories in Peenemünde where Germans were working on rocket projectiles.

Anti-Nazi Germans worked with Allied agents inside Germany. Their chief effort was an unsuccessful attempt to assassinate Hitler and take over the German Government on July 27, 1944.

The United States put many agents into the field. They operated under the control of the Office of Strategic Services, and performed many tasks behind enemy lines, both in Europe and in Asia.

Propaganda

The development of the radio greatly increased the use and effectiveness of propaganda during World War II. But it differed greatly from the propaganda of World War I. The Allies did not need to manufacture tales of Nazi cruelty. The bare truths of Nazi mass murders of Poles, Jews, and other peoples whom the Nazis considered "inferior" were almost unbelievable.

In the early part of the war the Germans used propaganda as a weapon. They tried to inspire fear and confusion in their enemies through motion pictures which showed the power of the German war machine with terrifying reality. The German propagandists under Joseph Goebbels also broadcasted confusing news reports during their various invasions. They used traitors from other countries to broadcast German propaganda. But after they had occupied most of Europe, their radio propaganda became largely ineffective. In the Allied countries, people listened to such broadcasters as William Joyce with amusement. The British named Joyce "Lord Haw Haw," to show their disdain for him.

The Allies used radio chiefly as a means of bringing truthful news to the Allied countries. The Germans forbade their own people and the Europeans under their control to listen to Allied broadcasts. But many people

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still listened secretly, and in that way got the true facts as to the progress of the war. The Allies also used leaflets dropped from airplanes to spread propaganda and information.

Invasion of Europe

For two years, the Soviet Union had been asking for a "second front in Europe." The invasions of North Africa and Italy had helped somewhat to relieve the pressure on Soviet troops. But this help was not enough.

Planning for the big invasion was begun in 1943 under the direction of General "Ike" Eisenhower. More than two million American and British troops were massed in the British Isles for the great attack. Sixteen million tons of arms, munitions, and equipment were stored up, ready and waiting. Four thousand ships and landing craft, including sixty types built especially for the invasion, were on hand. And eleven thousand planes were ready to give protection overhead.

Large-scale bombing of the French coast began three months before the invasion. Bombs were dropped not only at the intended landing places, but at other possible points of attack, so that the Germans could not guess where the invasion would take place.

D-Day. Twenty hours before the invasion began on "D-Day," hundreds of Allied bombers attacked the batteries, command posts, and control stations in the proposed landing area. Parachute troops went ahead of the invasion forces to cut railroad lines, blow up bridges, and seize landing fields. Gliders followed the paratroopers, bringing in men, jeeps, light artillery, and small tanks. By this time the great invasion fleet was on its way from Great Britain to the coast of Normandy, in northern France. Allied battleships fired two hundred tons of shells a minute toward the Nazi coast batteries. A half hour before the first landing on June 6, 1944, two thousand tons of bombs were dropped on the Normandy beaches.

Then the Allied troops waded ashore. British and Canadian forces landed near Caen, and pushed inland to capture Bayeux. United States troops landed on both sides of the Vire River.

Within five days the Allies had landed sixteen divisions and seized eighty miles of the coast of Normandy. They went on to take a large part of Normandy, and then began to pile up supplies for a great offensive on French soil. The Allies in France used man-made harbors until the port of Cherbourg was captured.

The "Break-through." The capture of St. Lô on July 18 opened the way for the Allies to break out of Normandy and push on across France. On July 25, three thousand bombers and a vast number of heavy guns began bombarding a section of the German line west of St. Lô. On that day and the next day, infantry and tanks followed up this preliminary attack, and succeeded in cutting through the German lines. Tanks raced south into Brittany and down to the Loire River. Another column of Allied troops headed east, directly toward Paris.

The Germans tried to counterattack. But British and Canadian troops broke through at Falaise to meet the United States forces and close a trap around the German Seventh Army. That army was destroyed in four

NORMANDY INVASION



Hitting the Beach. United States infantrymen storm the Normandy beachhead after dropping from the bows of an invasion barge. They crouch under the weight of full packs and rifles

as they wade waist deep in the rough waters of the English Channel toward enemy positions on the shore. The invasion of Normandy by the Allies began June 6, 1944.

Coast Guard, U. S. Navy



Anxious Eyes. On the bridge of the U.S.S. Augusta, part of the Allied invasion fleet, United States Navy and Army officers watch the progress of the invasion forces on the shore.



Objective Won. Admiral Harold R. Stark leaves a Nazi gun emplacement which was knocked out by naval shellfire on the shore of France during the opening stages of the invasion.



Supplies for the Battle of France. After the fighting had moved inland, the Normandy coast was still a busy place as thousands of ships scuttled back and forth from England, sup-

plying the Allied fighting forces with food, ammunition, and fuel for the armored divisions. This task was to last from invasion to final victory.

WORLD WAR II

days, and the road to Paris lay open to Allied armies.

Liberation of Paris. By August 19, two columns of General George Patton's troops had reached the Seine River, north of Paris. With rescue at hand, the people of Paris rose against the Nazis. They freed the city on August 25, before the Allies arrived.

Invasion from the South. On August 15, 1944, a strong Allied army landed on the southern coast of France. It swept inland to join the Allied armies fighting in the north. In two weeks it had taken the great industrial city of Lyon and was approaching the Belfort Gap.

On into Germany. The Allied armies in the north met little serious opposition. In great leaps they swept forward from the Seine past the Somme and the Marne rivers and across the Belgian border. Finally overlong supply lines forced them to stop. British and Canadian troops moved eastward along the coast, through Lille, into Belgium, and on across the border of The Netherlands. On September 11, the American First Army pushed through Luxemburg into Germany. Here, at the strong Siegfried Line, the Allied attack paused. A daring attempt to outflank the line by an air-borne invasion of the northern Netherlands ended in failure.

"Battle of the Bulge." In December, 1944, the Allies were massing men for a big attack. The German Marshal Gerd von Rundstedt found that the Allied lines in the Ardennes forest were thin and lightly held. With three German armies massed on a ninety-mile front, Von Rundstedt tried for a break-through. Every plane the Germans could spare was placed at his service. On December 16, the German armies struck.

The offensive split in three directions. The big drive was directed toward the north, in the direction of Liège and Antwerp. Smaller attacks were aimed toward Bastogne at the center, and Sedan in the south. The southern attack was stopped dead, and the northern push held only after some ground had been lost. But in the center the German attack carried fourteen miles in the first day. The Germans soon surrounded Bastogne in southern Belgium, and then pushed on toward the Meuse River. But the defenders of Bastogne, who were reinforced by air-borne troops, hung on to the city until American tank forces cut through the German lines to relieve them. The German advance was stopped just short of the Meuse, and within a week the Allies had regained all the ground lost in the offensive. They then pushed on into the Rhineland against heavy German opposition.

Beyond the Rhine. On February 27, 1945, the Allies attacked Cologne on the western bank of the Rhine River. The city fell seven days later. German forces hastily destroyed the bridges that crossed the Rhine. But at the little village of Remagen, near Cologne, Allied troops found a bridge that the Germans had neglected to destroy. The American First Army captured the bridge and moved quickly across the Rhine. On March 24, four more Allied armies crossed the river by boat, and two parachute divisions were dropped five miles beyond the river in German-held territory.

The Soviet Advance

Through 1943 the Soviet Union had been greatly

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increasing in strength. Lend-Lease supplies from the United States poured in through Murmansk, and through the Persian Gulf route. Soviet war factories also increased their production.

The German armies in the Soviet Union had been greatly weakened by the losses at Stalingrad and elsewhere and by the increasing difficulties of getting supplies. The last major German offensive in the Soviet Union took place in July, 1943, and was unsuccessful. Throughout 1943 and 1944, the Red Armies pushed the Germans from Soviet territory with ever-increasing speed.

In February and March, 1944, Soviet forces retook part of the Ukraine. In April and May, they recaptured the Crimea. Soviet troops drove a great wedge into the German central lines in July. They took White Russia and part of eastern Poland, as well as most of Lithuania. The rest of the Ukraine was liberated in July and August. Soviet troops also drove into Rumania in August. Rumania surrendered late in August, and Bulgaria was cleared of German troops.

In September and October, Soviet forces drove the Germans from the Baltic states. Also in October, Finland surrendered to the Allies and promptly declared war on Germany. In October and November, the Red Army drove into Hungary and joined forces with Tito in Yugoslavia. Finally, the Red Army swung northwest and captured Vienna and eastern Austria.

In the summer of 1944, Soviet troops approached Warsaw. Polish patriots in the city expected the Soviets to enter Warsaw soon, and rose up against the Germans. But the expected Soviet troops failed to arrive, and after sixty-three bloody days, the patriots were finally beaten down by the Germans. Soviet forces did not enter Warsaw until January. Then they pushed rapidly westward and northward. The Polish corridor was cleared in March, and East Prussia fell in April. At last the Soviet forces moved into Germany itself. In the north they moved toward the Oder River. In the south they pushed on through Silesia toward Dresden.

Victory in Europe

The last days of the war in Europe were days of rapid advances on all fronts. Soviet forces drove toward Berlin from the east and south. From the west, American and British troops pushed toward the German capital. Another American spearhead moved southeast toward Czechoslovakia and Austria. Its aim was to cut off Berlin from the Bavarian Mountains in southern Germany, where the Germans spoke of making a last stand.

German resistance weakened swiftly under heavy Allied air attacks and the assaults of the swift moving armies. On April 22, 1945, Soviet troops began shelling Berlin, and took sixteen suburbs. On April 27, Soviet and American troops joined at the Elbe River, northwest of Dresden. In Italy, on April 28, Italian patriots killed Benito Mussolini. On April 29, the German forces in Italy surrendered. On May 1, Hitler reportedly killed his wife, Eva Braun, and himself in the bomb shelter under his Chancellery. Admiral Karl Doenitz followed Hitler as Fuehrer. On May 2, 1945, Berlin surrendered.

Five days later, on May 7, German emissaries entered a schoolhouse in Reims, France, where General Eisen-

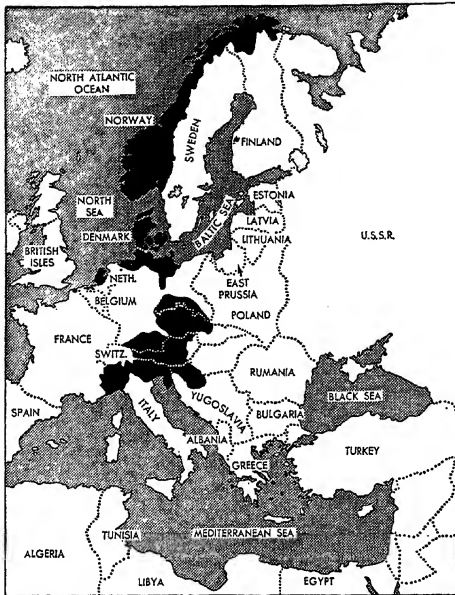


THE WAR'S SUFFERING CIVILIANS

Above: A bombed French home. *Upper right:* Ruin in Belgium. A mother and her children view the destruction of their home town. *Right:* Driven into the subway by Nazi bombs, these Londoners try to forget the horror hovering over them. *Below:* Part of London after a bombing raid.

Photos: International News; Acme





Areas Still Held by Germany Just before Surrender are shown in black. Allied troops from the west, and Soviet forces from the east, met at the Elbe River, April 27, 1945.

hower had his headquarters. There they signed the following surrender document:

(1) We the undersigned, acting by authority of the German high command, hereby surrender unconditionally to the supreme commander, Allied Expeditionary Force, and simultaneously to the Soviet high command all forces on land, sea, and in the air who are at this date under German control.

(2) The German high command will at once issue orders to all German military, naval and air authorities and to all forces under German control to cease active operations at 2301 hours (11:01 P.M.) Central European Time on eight May and to remain in the positions occupied at the time. No ship, vessel or aircraft is to be scuttled, or any damage done to their hull, machinery or equipment.

(3) The German high command will at once issue to the appropriate commanders, and insure the carrying



Acme Telephoto

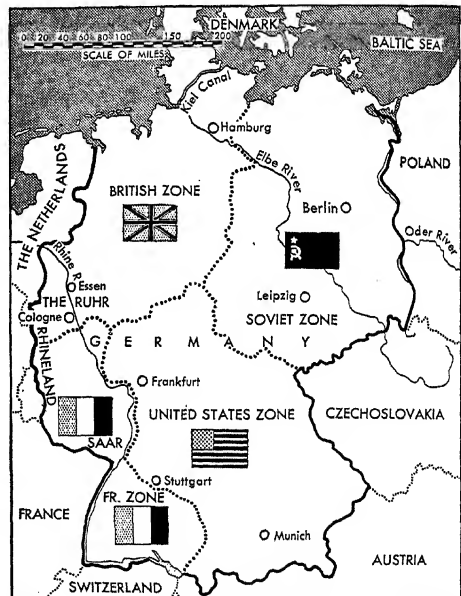
General Gustav Jodl Signing German Surrender at Allied Headquarters in a schoolhouse at Reims, France.

out of any further orders issued by the supreme commander, Allied Expeditionary Force, and by the Soviet high command.

(4) This act of military surrender is without prejudice to, and will be superseded by, any general instrument of surrender imposed by, or on behalf of, the United Nations and applicable to Germany and the German armed forces as a whole.

(5) In the event of the German high command or any of the forces under their control failing to act in accordance with this act of surrender, the supreme commander, Allied Expeditionary Force, and the Soviet high command will take such punitive or other action as they deem appropriate.

The surrender was ratified on May 8 in Berlin. After the surrender, Allied forces moved to occupy all Germany. As a result of agreements made between Great Britain, the United States, the Soviet Union, and France, Germany was divided into four zones of occupation inside its 1937 frontiers. Eastern Germany went to the Soviet Union. British forces occupied northwestern Germany, and United States forces occupied southwestern Germany. France took over the Rhineland and the Saar Valley. All four countries were given zones in Berlin where an Allied council directed the general occupation. The four occupying countries also sent troops



At the End of World War II, Germany was divided into four zones of occupation, shown by dotted lines.

into Austria, which regained its independence. The Soviet Union continued to occupy the Balkan states. German civilians were removed from Poland, and from the parts of eastern Germany which the Allied powers had generally agreed would go to Poland. The Soviet Union annexed part of East Prussia. The rest of East Prussia and German lands east of the Oder went to Poland. Germans were also removed from Czechoslovakia.

The War in the Pacific

Prelude to War. The United States had long hoped to keep out of World War II. For four years after the beginning of the Chinese-Japanese fighting in 1937, the United States had continued to sell Japan oil, scrap iron, and other war materials, although the sympathies of the American people were on the side of the Chinese. But the United States Government made it clear that there were limits beyond which it would not permit the Japanese to go.

In July, 1941, the Japanese Government seemed determined to make further conquests in French Indo-China and perhaps in Siam. President Roosevelt served warning on Japan by stopping the sale of oil to the Japanese. He also "froze" all Japanese assets in the United States. This action had the effect of stopping Japan's trade in the United States. Great Britain took action similar to that taken by the United States. Japan then froze American and British assets in Japan.

In October the tenseness of the Pacific situation increased when a new Japanese cabinet took office. The new premier was General Hideki Tojo, the leader of the most extreme group of Japanese militarists. His cabinet at once began planning for war.

In November, 1941, Saburo Kurusu, a Japanese diplomat, flew to the United States to help Japanese Ambassador Kichisaburo Nomura in his negotiations with the United States Department of State. On November 10, Japanese troop movements in southeastern Asia led Prime Minister Churchill to warn Japan that, if the United States should become involved in a Pacific war, the British would enter the war "within the hour."

On November 15, Premier Tojo called on the Japanese Diet to approve a huge war appropriation. The negotiations between Kurusu and Nomura and Secretary of State Cordell Hull made no progress. Late in November, Hull warned the United States Cabinet that the situation had now gone beyond diplomacy and was chiefly a military matter.

Pearl Harbor Attack. The Japanese war machine got under way in November. About the middle of the month a large fleet of aircraft carriers, battleships, cruisers, destroyers, and submarines left Japanese ports on a highly secret mission. Their secret became known to the world at 7:55 A.M., Sunday, December 7, 1941, when more than 100 Japanese fighting planes, torpedo bombers, and dive bombers appeared over Hawaii. They attacked Pearl Harbor, the United States' largest naval base in the Pacific, as well as army air bases and targets around Honolulu. The greatest amount of damage done occurred at Pearl Harbor and at the near-by army air base of Hickam Field.

When the attack began, eight battleships, seven cruisers, twenty-eight destroyers, and five submarines were in Pearl Harbor. Fortunately, no aircraft carriers were present. The carrier *Enterprise* was at sea, only a few hours' distance away, but it was not attacked.

When the attack ended one hour and fifty minutes later, five of the American battleships had been sunk, and the other three had been damaged. Three of the five sunken battleships were later refloated and repaired. Three destroyers, a mine layer, and a target vessel were

also sunk, and a number of other ships were damaged. All the damaged ships were finally repaired. About 150 of the 202 navy planes in Hawaii were destroyed, as well as most of the 273 army planes. The American dead included 2,343 sailors, soldiers, and marines. Other casualties included 1,272 wounded and 660 missing. Many of the docks, repair facilities, hangars, and runways were damaged or completely destroyed. The Pacific Fleet and the entire defenses of Hawaii had been dealt a seriously crippling blow. The Japanese had not been able to knock out the Pacific Fleet, and they did not take advantage of what might have been a good opportunity to seize Hawaii. But they had removed many obstacles in their path of conquest in the Pacific.

The responsibility for the great American losses at Pearl Harbor was the cause of much dispute. In January, 1942, a report by a committee headed by Justice Owen J. Roberts of the United States Supreme Court found that the Pacific Fleet commander, Admiral Husband E. Kimmel, and the chief army commander in Hawaii, Lieutenant General Walter Short, had made "errors of judgment." After the war a Congressional investigation reprimanded these officers for failure to alert forces under their command. But the investigation also found that head officials in Washington had not drawn all the conclusions possible from information available on Japanese movements. The general decision was that the United States as a whole had failed to be alert.

The United States at War. An hour after the attack on Pearl Harbor, the Japanese envoys in Washington handed Secretary of State Hull a note saying that negotiations no longer had any purpose. In Tokyo, the Japanese Government declared war on the United

The Allies

Argentina	Liberia
Australia	Luxembourg
Belgium	Mexico
Bolivia	Netherlands, The
Brazil	New Zealand
Canada	Nicaragua
China	Norway
Colombia	Panama
Costa Rica	Persia
Cuba	Poland
Czechoslovakia	San Marino
Dominican Republic	Saudi Arabia
Egypt	Turkey
El Salvador	Union of South Africa
Ethiopia	Union of Soviet
France	Socialist Republics
Greece	United Kingdom of Great Brit-
Guatemala	ain and Northern Ireland
Haiti	United States
Honduras	Uruguay
India	Yugoslavia
Iraq	

The Axis

Bulgaria*	Hungary**	Rumania*
Finland	Italy**	
Germany	Japan	

*Until 1944.

**Until 1945.

States, Great Britain, and The Netherlands. On December 8, President Roosevelt asked Congress to declare war on Japan. Congress immediately passed the declaration. Only one person voted against the war. The vote was cast by Congresswoman Jeannette Rankin, who had also voted against the war declaration in World War I.

Great Britain also declared war on Japan on December 8. Three days later, Germany and Italy declared war on the United States, and Congress replied with declarations of war against Germany and Italy.

The Japanese Sweep Ahead

From the time of the attack on Pearl Harbor until the spring of 1942, Japanese forces pushed forward with little opposition. The speed and efficiency of Japanese operations showed that they were based on careful planning over a long period. Troops, ships, and equipment had been assembled at the proper places weeks and months ahead of the initial attack. The Allied forces were outnumbered and outsupplied. They fought bravely, but were unable to hold back the Japanese tide of conquest.

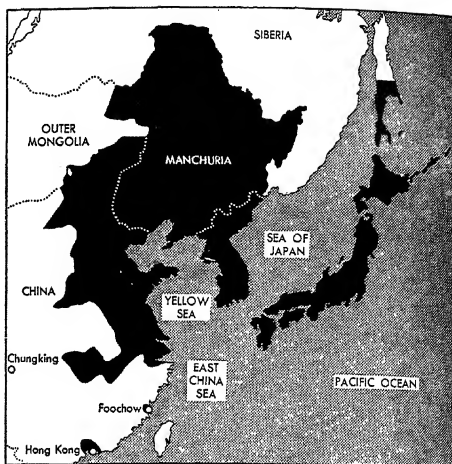
Wake and Guam. The United States had three outposts between Hawaii and the Philippines. These were Midway, Wake, and Guam Islands. The Japanese moved immediately to take two of these islands. Guam surrendered almost at once. Wake's defenders fought a long but losing battle. Finally on December 23, 1941, the United States troops on Wake also surrendered.

Philippine Islands. General Douglas MacArthur had been in the Philippines since 1936, preparing the defenses of the islands against a probable Japanese attack. But when the attack came, his ten-year program was only half finished. His forces included about 90,000 troops (including about 19,000 Americans), and an air force of about thirty-five Flying Fortress bombers, 107 P-40 fighter planes, and 100 other aircraft. The naval defenses of the island were equally small. Admiral Thomas C. Hart, commander of the United States Asiatic Fleet, had only a tiny force.

About nine hours after the Japanese attacked Pearl Harbor, their bombers also raided Clark and Nichols airfields near Manila. In a series of bombings they destroyed most of the American aircraft on the ground. Three days later, Japanese bombing knocked out the Cavite naval base, and Admiral Hart was forced to withdraw his forces to bases in the south, mostly in Malaya and the Netherlands Indies.

The destruction of American aircraft and the withdrawal of the naval forces meant that Japanese troop transports could approach the Philippines without danger. On December 10, the first Japanese troops landed on the northern coast of Luzon. Twelve days later a major force landed on the shores of Lingayen Gulf, about 100 miles north of Manila. Another force came ashore at Lamon Bay, south of Manila. The three main Japanese columns rapidly approached each other on the road to Manila. On December 26, General MacArthur declared Manila an open city and withdrew his troops to the Bataan Peninsula, northwest of the Philippine capital. Manila fell on January 2, 1942.

Bataan and Corregidor. The Japanese apparently



The Japanese Empire at the Start of World War II

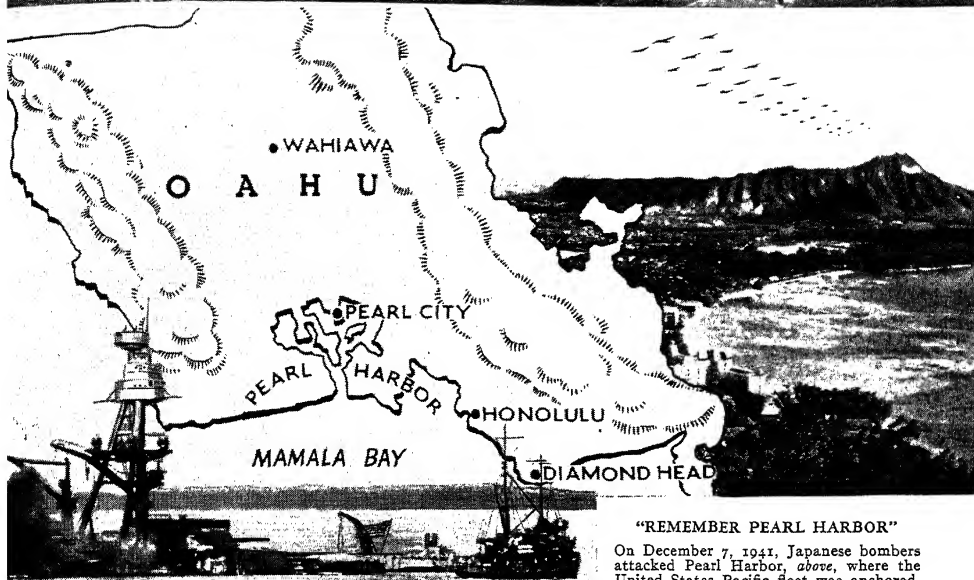
expected Bataan and Corregidor to fall almost as rapidly as the rest of Luzon. But they found American and Filipino resistance very heavy. For more than three months the Japanese were stopped. But the American forces were finally defeated, more by lack of food, medicine, and supplies than by the Japanese troops.

President Roosevelt ordered General MacArthur to leave the Philippines and proceed to Australia to form a new army group. On March 11, MacArthur left Bataan by motor torpedo boat, under cover of darkness, and went to Mindanao. There he took a plane to Australia. General Jonathan M. Wainwright was left in command of the Philippine troops. On April 9, 1942, General Wainwright surrendered his forces on Bataan. The 11,000 men on Corregidor, the fortified island guarding the entrance to Manila Bay, held out until May 6. The Japanese had already occupied most of the other islands of the Philippine group.

Hong Kong, Malaya, and Singapore. The Japanese attacked the British possessions in the Far East at about the same time they attacked American holdings. The pattern of conquest proceeded in much the same fashion. Hong Kong was defended by a valiant group of troops, largely Canadian. But Japanese forces almost completely cut off the crown colony from its supplies, and it soon ran very short of water. The colony surrendered on December 25, 1941.

Many persons had considered the British fortress of Singapore completely able to resist any attack. The British fleet based there was strong, and the coastal guns defending the base were among the most powerful in the world. But the defense of Singapore was based largely on the belief that the city would be attacked from the sea. Instead, the Japanese chose to fight southward through the jungles to Singapore. Thus they surprised the British.

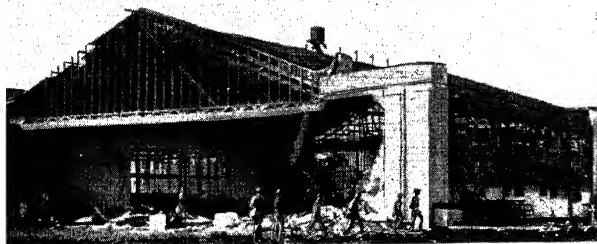
Immediately after their declaration of war, the Japanese moved from French Indo-China into Siam. There they met no resistance, and soon they crossed the Siamese border into Malaya. Just after the Pearl Harbor attack, Japanese troop transports were sighted

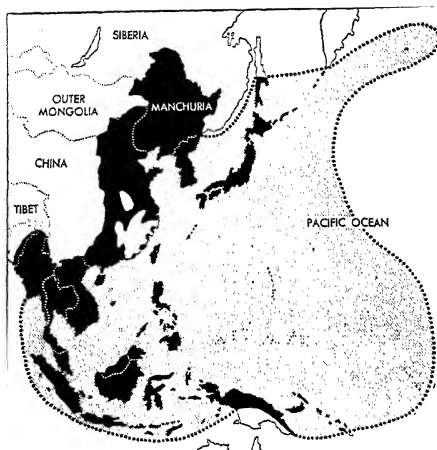


"REMEMBER PEARL HARBOR"

On December 7, 1941, Japanese bombers attacked Pearl Harbor, *above*, where the United States Pacific fleet was anchored, and sank several ships, including the battleship *Arizona*, *above foreground*. Diamond Head, famous Hawaiian landmark, is shown in the background. The attacking planes also rained bombs on Hickham Field, *top*, where American fighter planes were concentrated, destroying a large number of planes and causing great damage to hangars, *left*. Emergency first-aid workers, *lower left*, bombed out of their quarters, took care of the wounded and injured. Japanese midget submarines, forty-one feet long, and manned by only two men, found their way into the harbor and launched their torpedoes. One of the attacking submarines, *below*, was captured by the Navy.

Photos: Press Association; Acme





Japanese Empire at Its Greatest Extent during the War

near the eastern coast of Malaya. The British battleship *Prince of Wales* and *Repulse*, headed north to cut off these transports. But Japanese torpedo bombers sank both British ships, and broke the strength of the British fleet in the Far East.

Japanese troops then landed on the Malayan coast. Within two months, these troops, trained in jungle fighting, sliced their way through Malaya to the gates of Singapore. The British air force was small, and the Japanese bombed the city heavily. The big guns pointed toward the sea and could not be turned on the Japanese. Singapore surrendered to the Japanese on February 15, 1942.

The East Indies. Allied military planners had not believed the Japanese would be able to attack more than one or two military strongholds at any one time. These strategists had hoped to fall back slowly, and thus find time to strengthen Allied defenses. But the Japanese had made much bolder plans than the Allies suspected, and they were able to carry out their plans. The Japanese began to overrun the Netherlands East Indies at the same time they attacked Hawaii, the Philippines, and Malaya. As a result, Allied forces in the East Indies had to be spread very thinly over great stretches of territory.

Japanese forces invaded Borneo in December, 1941. They also took Amboina in the Banda Sea. Turning westward they landed in the Celebes, New Ireland, and the Admiralties. Later, in 1942, they landed in New Britain and the Solomons. They took the Portuguese island of Timor and seized ports along the New Guinea coast. Java and Sumatra were the strongest points in the East Indies. But the fall of Singapore prevented a successful defense of Sumatra, and Java itself was soon surrounded.

For a time the combined Asiatic fleets of the United States and The Netherlands held back the Japanese. In the battle of the Strait of Macassar from January 23 to 28, American destroyers sank a number of ships in a Japanese convoy. But a month later in the battle of the Java Sea, most of the Dutch and American forces were

wiped out. The sinking of the aircraft transport *Langley* in this battle removed the last chance of building up the Allied air force in Java. All the Netherlands Indies surrendered on March 7, 1942. The Japanese were in complete possession of most of the southwestern Pacific and were ready to strike at Australia. As early as February 19, Japanese aircraft bombed Darwin, Australia's northernmost port.

Burma. In December, 1941, Japanese troops crossed the border of Burma. This country was valuable to the Allies for its oil and tin. Also, the Burma Road from Rangoon into China was the last land route open to China.

Late in January, 1942, Siamese troops joined the Japanese in Burma. The British fell back to Rangoon but could not hold that city. Chinese troops under General Joseph Stilwell tried to hold Mandalay and to protect the Burma Road, but were forced to give up. Stilwell tramped with a handful of his men through 140 miles of mountains and jungle to India. His retreat is famous as "Stilwell's March." By early spring of 1942, Burma was lost and the Burma Road was cut. The Japanese were on the border of India. Mahatma Gandhi threatened to call a general strike in India, and the British put him in jail. Japanese planes and submarines operating from Malaya attacked Allied shipping in the Indian Ocean. But the British occupied the French island of Madagascar, and this helped protect Allied shipping.

First Allied Victories

Official Japanese documents found after the war showed that the Japanese had not at first intended to extend their conquests beyond the points reached by the summer of 1942. They believed that control of the wealth of these regions would make them so powerful that they could resist any attack. They also counted on German strength in Europe to keep the United States and Great Britain sufficiently busy to prevent an Allied counterattack in the Pacific. They hoped that eventually the Allies would agree to make a peace which would leave Japan in possession of all its conquests.

But by early 1942 the Japanese recognized that the Allies would never be willing to make such a peace. On January 31, 1942, a small American naval force raided Japanese strongholds in the Marshall and Gilbert islands. Three weeks later a similar force attacked Wake and Marcus islands. In March, Salamaua and Lae in New Guinea were attacked. On April 18, 1942, American twin-engined bombers raided Tokyo, Kobe, and Osaka. This attack terrified the Japanese because they had believed their islands were so far away from American bases that they could not be bombed. The attacking planes were sixteen B-25's, led by Colonel James Doolittle. They had been launched from the aircraft carrier *Hornet*.

Battle of the Coral Sea. American attacks convinced the Japanese that they would have to expand farther than they had intended in order to protect their newly won empire. Their first move was a planned attack on the Port Moresby district of southeastern New Guinea. From here they hoped to be able to cut Allied shipping lanes to Australia, and perhaps to invade Australia

itself. These plans were stopped in the Coral Sea during the period from May 4 to May 9, when an American carrier force intercepted the main Japanese battle force. In a long-range carrier-plane battle, the Japanese warships were so damaged that they had to turn back. American losses were also heavy. They included the aircraft carrier *Lexington*.

Battle of Midway. A second part of the Japanese plan was to occupy the American island of Midway. From here they hoped to be able to attack Hawaii with land-based planes. But their plans were blasted in the naval battle of Midway, which many students of the war call the turning point of the entire Pacific campaign.

After the war the navy revealed that naval intelligence had been able to break down Japanese coded messages even before the attack on Pearl Harbor. American forces thus knew the general plan of the attack on Midway. On June 3, 1942, a navy patrol plane sighted the Japanese fleet about 700 miles west of Midway. All available American forces were already near the scene. On the afternoon of June 3, Flying Fortresses from Midway attacked the Japanese transports. The next morning, Japanese carrier-based aircraft bombed Midway. That afternoon, carrier planes from both sides attacked each other's ships. Both sides lost many planes. The Japanese also lost four of their carriers. The American loss was only one carrier, the *Yorktown*. Without carriers from which to fly their planes, the Japanese fleet was forced to withdraw.

The Japanese were never again able to restore their carrier strength adequately. But within six months, the American carrier strength was almost twice that which the Japanese had had at the beginning of the war. At Midway the Japanese lost the power of the offensive, and they were never able to recover it.

The Aleutians. Part of the Japanese plan of action at Midway was a side attack on the Aleutians. This was the only phase of the campaign that succeeded. On June 3, 1942, Japanese airplanes raided the American air and naval base at Dutch Harbor, Alaska. A few days later Japanese troops occupied Attu and Kiska islands, more than 600 miles to the west. They occupied a third island, Agattu, early in July.

But the Japanese were never able to make much use of these bases. In October, 1942, American forces set up a base on Adak in the Andreanof Islands, and in January, 1943, they occupied Amchitka. From here they were able to bomb the Japanese in the Aleutians. In a landing the next spring they drove the Japanese from Attu. The Japanese chose to withdraw from Kiska and Agattu. From these bases American planes made frequent raids on Paramushiru and other Japanese bases in the Kurile Islands north of Japan proper until the end of the war.

The Allied Offensive

The actions in the Coral Seas, at Midway, and in the Aleutians marked the end of Japanese expansion. From that time until the end of the war, except for minor actions in China and Burma, the Japanese were always on the defensive.

Allied Strategy, in which United States forces played by far the greatest part, began to take shape in the late

summer of 1942. The Allied forces in the Pacific had the following three major aims.

To drive through the Japanese positions in the Central and South Pacific, and retake the Philippines.

To cut Japan's lines of communication with its bases, and its sources of such war materials as oil, tin, and rubber, in the Indies and Malaya.

To establish bases in the West Pacific for the final attack on Japan itself.

Each aim fitted neatly with the next. If American forces retook the Philippines, the Japanese supply lines would almost automatically be cut. The final attack on Japan itself could be made from the Philippines and other bases taken along the way.

The planning and carrying out of these operations was divided into two main commands. General MacArthur commanded the Southwest Pacific area which carried out operations in New Guinea, the Solomons, and other islands south of the equator. Admiral William Halsey led the American and Australian naval units taking part in these campaigns. The direction of the Central and North Pacific campaigns was in the hands of Admiral Chester Nimitz, commander of the Pacific Fleet and commander of Pacific Ocean areas. MacArthur and Nimitz planned their separate operations so that they fitted into the same over-all pattern of attack. In the later stages of the war, the two main forces often took part in the same campaigns and shared the same bases.

The Growth of Allied Power. The miracle of American productive power played an enormous part in speeding the Allied victory in the Pacific and in cutting Allied losses. Allied defeats in the first stages of the war cost heavily in ships, planes, and other equipment. But American factories and shipyards rapidly replaced these losses and finally multiplied Allied military strength many times. American naval strength at the beginning of the Pacific war was scarcely great enough to carry out any one of the several operations that took place during 1944 and 1945. Yet in those years several such operations took place at the same time.

Allied inventive genius aided greatly in speeding victory. Radar provided ships and land bases with protection against enemy aircraft. The highly secret electronic fuse greatly increased the effectiveness of anti-aircraft shells. Skillfully designed landing craft made the capture of the numerous Japanese island bases much easier. Such weapons as the flame thrower and the bazooka helped Allied soldiers and marines clear the invaded islands of stubborn Japanese defenders.

New Tactics. The navy worked out an entirely new system of tactics to fit the emphasis placed on aircraft carriers. One of the miracles of navy tactics was the setting up of supply trains that provided the fleets with fuel, ammunition, food, and other supplies, so that ships could remain at sea for long periods of time. With the use of repair ships and floating drydocks, complete naval bases could be set up in deserted mid-Pacific harbors.

The geography of the Pacific called for the development of co-ordinated land, sea, and air operations. Such amphibious, or combined land and water, warfare tactics were also used in Europe, but they were developed chiefly for the Pacific theater.

Fighting Methods. One of the first difficulties of the Allied forces in the Pacific was understanding and dealing with the unusual methods of fighting which the Japanese used. The *Bushido* code of warfare of Japan required Japanese soldiers to fight to the death. Japanese soldiers were much less cautious than Western soldiers. They were willing to take enormous risks because they believed that death in battle was a glorious death. But the Japanese daring suicidal impulse cost the Japanese many ships, planes, and troops which they could not well afford to lose.

The Allied soldiers turned out to be much more adaptable than the Japanese to the various conditions of weather and warfare. This adaptability brought the Allies great advantages.

Rules of Warfare. The Japanese had never signed the Geneva Convention concerning rules of warfare. They forbade their soldiers to be taken prisoners, and felt great scorn for Allied soldiers who allowed themselves to be captured alive. Many Allied prisoners of war were seriously mistreated by their Japanese captors. After the war many Japanese guards and camp commanders were charged with war crimes involving mistreatment of prisoners. The few Japanese whom the Allies took prisoner were generally treated according to the Geneva Convention. Japanese civilians in Allied occupied territories were well treated.

Beyond the treatment of prisoners, both sides adopted the general rule of military necessity, rather than other rules of international warfare. Neither side used poison gas, because it was not profitable. But both the Allies and the Japanese bombed open cities, and attacked enemy ships of all kinds without warning.

The Road Back

When General MacArthur arrived in Australia from the Philippines, he made a promise to the defenders of the Philippines. He said, "I shall return." In the summer of 1942 MacArthur started the long push back. He began his return by a slow advance northward across the Owen Stanley Mountains of southeastern New Guinea.

Guadalcanal. On August 7, 1942, the curtain went up on the first act of the major Allied offensive in the Pacific. American marines went ashore on Florida, Tulagi, and Guadalcanal islands in the southern end of the Solomons group. Japanese bases which were located here threatened the life line between Australia and the United States. American capture of these bases threatened Japanese control of a main part of their South Pacific empire.

The fighting on the three islands was bitter. Allied and Japanese forces were almost evenly matched on land. The final outcome depended largely on which side could gain and hold control of the sea and air around the islands. On the ocean, control seesawed back and forth for three months.

On August 8, the Japanese fleet surprised the Allied naval force covering the Guadalcanal landings and sank one Australian and three American cruisers. American shore forces were bombarded heavily from Japanese vessels. Two weeks later the Japanese lost several ships in a two-day battle. On September 15, the Ameri-

can carrier *Wasp*, and five destroyers were sunk by the Japanese. In October, United States forces sank most of the ships of the "Tokyo Express," a Japanese merchant fleet which was trying to bring supplies to Guadalcanal. Later, United States forces sank a number of Japanese naval vessels. But during the same month Japanese ships bombarded Guadalcanal heavily.

The final important battle occurred in mid-November. It was called the Battle of Savo Island. So many Japanese warships were sunk or badly damaged in this engagement that the Japanese navy never again seriously challenged the Allied positions in the Solomons. Allied losses were also heavy, but in the end the number of losses was not important so far as strategy and future success were concerned. The replacement of losses was the most vital point, and the United States was able to build new ships several times as fast as the Japanese could.

American army troops finally cleared Guadalcanal in February, 1943. For a time the Japanese air force was a serious threat. But Allied planes and pilots finally proved more effective than the Japanese, and by late 1942 had control of the air over the Solomons. From Guadalcanal, American forces continued to drive northward in the Solomons. They took all or part of several islands, and by sea and air raids they cut off the other Japanese bases in the area. The Allies did not occupy the great base of Rabaul in New Britain until after the war. But by late 1943, Allied sea and air attacks had made Rabaul almost useless to its Japanese defenders.

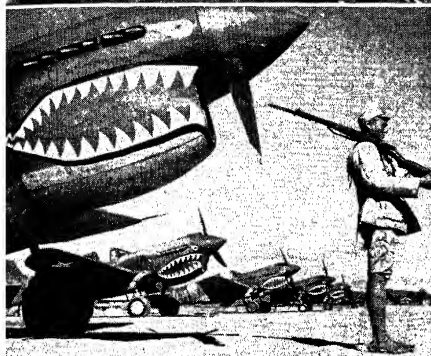
The Central Pacific

The Japanese held many important bases in the Gilbert, Marshall, Caroline, and Marianas islands, stretched halfway across the Central Pacific. Chief among the island bases were Tarawa, Kwajalein, Truk, Yap, the Palaus, Saipan, and Guam. These bases and others served as "unsinkable aircraft carriers," or bases for the aircraft which controlled thousands of square miles of the Pacific.

The Allies knew little about any of these island bases except Guam. Since 1919 the Japanese had kept all foreigners away from the islands. An effort to gain information was one of the main purposes of the Allied naval raids on the Marshalls and Gilberts in January and February of 1942, and of the Allied raid on Makin Island in the Gilberts by Marines under Colonel Evans Carlson in August, 1942.

The Allied strategists believed that the Central Pacific fortress of the Japanese could be cracked. They did not intend to capture each island separately. Such a plan would have taken too long and cost too much. Instead, the Allies adopted the plan of "island hopping." By this plan they took only a few key islands along the way. Each island taken provided a base from which other islands could be taken. Allied planes and ships based on the captured islands made it impossible for the Japanese to operate from other bases in the area. Thus the Allies did not need to capture all the islands.

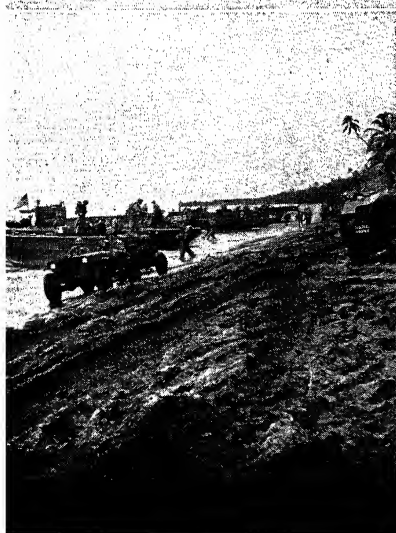
Tarawa. The first major step in the Central Pacific campaign was the capture of Tarawa, an island group in the Gilbert Islands. The main purpose of taking it



THE WAR AGAINST JAPAN

Top: United States landing ships, popularly known as Green Dragons, approaching Rendova Island in the central Solomons. *Second left:* Decorated planes of the Flying Tigers at a Chinese air base; this famous American volunteer group was organized by Brigadier General Claire L. Chennault. *Left:* United States Marines landing jeeps and tanks on Guadalcanal from specially constructed landing barges. *Above:* A group of Marines preparing to leave Guadalcanal after months of bitter fighting. *Below:* A detail of soldiers carrying back a wounded comrade during operations on Attu Island in the Aleutians.

Photos: U.S. Marine Corps; Aome; British Combine



was to give the Allies an air base from which planes could bomb and photograph positions in the Marshall and eastern Caroline Islands.

The landing on Tarawa on November 22, 1943, tested the new Pacific pattern of amphibious assault, and it proved largely satisfactory. Before the landing, naval guns and carrier planes shelled and bombed the island. Lack of knowledge concerning tides and reefs cost the lives of many marines as they headed ashore in their landing craft. Once on shore they found the island studded with many well-armed concrete pillboxes. They also found the Japanese willing to fight to the last man. Eventually, nearly all the Japanese were killed, but not before the attack had cost the lives of nearly 3,000 American Marines. During this battle, the torpedoing of the escort carrier *Liscomb Bay* also resulted in the death of nearly 1,000 sailors.

The Marshalls. In mid-January, 1944, the largest naval force the world had ever seen set forth from Pearl Harbor and other bases. This was the United States Fifth Fleet, under the command of Admiral Raymond A. Spruance. Its backbone was a force of more than a hundred carriers, battleships, cruisers, and destroyers called Task Force 58. The fleet also included transports, landing craft, tankers, small carriers ferrying replacement aircraft, supply ships, and hospital ships. These ships carried with them everything needed for the complex mechanism of modern warfare. They were headed for the Marshall Islands.

Air photographs of the Marshalls taken by airplanes based at Tarawa made the planning of the operation much easier. Preliminary bombings from Tarawa had damaged the Japanese defenses on the Marshalls. On February 1, infantry troops landed on Kwajalein Atoll in the center of the Marshall group, while ships and planes bombarded the other islands surrounding Kwajalein. The Americans took Kwajalein in three days. Shortly afterward, American ships were anchored in its lagoon and American planes were using its airfields. Majuro Atoll, southeast of Kwajalein, was taken at the same time. It provided an excellent anchorage and air base. In mid-February, Eniwetok Atoll in the northwestern Marshalls was also captured after heavy fighting.

Task Force 58 stopped in Majuro to refuel and then sailed westward to attack Truk, the strongest of all the Central Pacific Japanese bases. Most Japanese naval vessels had fled before the attack, but the Americans destroyed many Japanese planes and installations. The most important result was the fact that the Allies had shown the Japanese that none of their bases was safe from attack. This point was driven home a few days later when Task Force 58 also raided Saipan, the key Japanese base in the Marianas.

Central Pacific Raids. The Fifth Fleet spent the spring of 1944 in making further raids on Central Pacific bases and in supporting land operations to the south. New ships constantly increased the power of the force. None of these ships was sunk until October, 1944. Raids were made on Palau in the western Carolines, as well as on Woleai, Yap, Truk, Kusaie, and Ponape. Operations in New Guinea were also supported by carrier aircraft.

The Marianas. The next main operation in the Cen-

tral Pacific was the capture of Saipan, Guam, and Tinian in the Marianas group. These islands were a keystone of the Japanese Pacific defenses. They were within air range of the Philippines and within long-range bomber reach of Japan. Aerial patrol from them could cover most of the seas between them and the China coast.

The operations against Saipan began with aerial attacks by Task Force 58 planes against Guam, Tinian, and Saipan. Tiny Iwo Jima, halfway between Tokyo and Saipan, was also bombed to keep planes coming from Japan from using it as a base. Marines and infantry landed on Saipan on June 15. The main fighting ended on July 9.

The Japanese navy made a major effort to block the Saipan assault. Japanese carriers went into action against the American forces for the first time since early 1943. But in the Battle of the Philippine Sea on June 18 and 19, the Japanese carrier pilots proved no match for the American fliers. More than 400 Japanese planes were shot down, and no American ships were lost. Robbed of its airpower, the Japanese fleet turned and fled westward. In a long chase, American planes overtook it and sank or damaged four carriers as well as several other ships.

In July, American troops landed on and soon captured Guam and Tinian islands. Raids were made again on the western Carolines, the Palaus, and Iwo Jima.

The South Pacific

New Guinea. The Japanese bases along the northern coast of New Guinea were a threat to Australia to the south. From these bases Japanese planes could bomb Darwin and attack Allied shipping approaching Australia.

In mid-1942 General MacArthur set up a base at Port Moresby. The Japanese defeat in the Battle of the Coral Sea kept them from attacking Port Moresby by sea, but in the fall of 1942 they launched an overland campaign which brought them within thirty-two miles of the town. Then Australian and American troops began pushing the Japanese back.

The campaign was painfully slow. For many months, the Allied forces were poorly supplied and lacked sufficient air support. Tropical diseases kept many men out of action. Allied troops had to learn the strange arts of jungle warfare by costly experience. But each month they inched closer to Buna, Gona, Salamaua, and Lae, the main Japanese positions along the northeastern coast.

For many months, the contest was largely a matter of supply. Japanese planes operating from Rabaul attacked Allied shipping around New Guinea. But the growing Allied air force in the Solomons gradually made this base less valuable to the Japanese. In March, 1943, American aircraft sighted a large Japanese convoy steaming toward New Guinea in the Bismarck Sea. During the next three days, bombers using a new low-flying bombing technique called "skip-bombing" nearly wiped out the 22-ship convoy. After this time, the Japanese found it almost impossible to move troops and supplies around New Guinea. Allied aircraft sank ships, and PT-boats and planes sank the barges which tried to move along the coast.

WORLD WAR II

Encirclement. In the fall of 1943, Allied forces captured Salamaua and Lae. Air bases here added to the pounding Allied forces were able to give Rabaul. In December, American Marines were able to land in western New Britain. From that time on, General MacArthur was able to use the same system of by-passing major Japanese positions that Admiral Nimitz and his forces had proved effective in the Central Pacific.

In February, 1944, American forces took the Admiralty Islands after brief resistance. Manus Harbor there provided a magnificent base for the Seventh Fleet which supported MacArthur's operations. In the spring of 1944, MacArthur began a series of jumps along the northern New Guinea coast, and captured with little fighting such bases as Aitape, Wewak, Hollandia, and Biak. By fall, he was within striking distance of the Philippines.

Return to the Philippines

Preliminary Operations. During 1944 Admiral Nimitz' Central Pacific forces and General MacArthur's South Pacific forces had been like two arms reaching across the Pacific toward their common goal—the Philippines. By September, they had reached a point at which they could work together.

About September 1, a new fleet put to sea. Actually, the ships were the same as the ones which had been in the Fifth Fleet, but the group was called the Third Fleet because it had passed to the command of Admiral Halsey. The carrier force of the Third Fleet began a series of air attacks on the Central Philippines. Resistance was surprisingly light, and Halsey decided to send his planes to the Manila area of Luzon. The air attacks destroyed many Japanese aircraft and much Japanese shipping with small American losses.

On September 15, Allied forces landed on Peleliu Island in the southern Palau, and on Morotai Island, about 400 miles south of Mindanao. These islands were to be used as bases to launch softening-up air attacks on the Philippines. But the light resistance from the Japanese in the Philippines brought about a change in plans. MacArthur and Halsey decided to land in the Philippines about a month earlier than previously planned. They also decided to land on the eastern beaches of Leyte Island, in the central Philippines, rather than on Mindanao, the objective chosen at first. The capture of Ulithi Atoll in the eastern Carolines without resistance on September 20 gave the navy a base much closer to the new scene of operations.

Leyte. The first Philippine landings were preceded by a new series of daring carrier raids. In the ten days before the landing, Halsey's forces struck at Japanese airfields in Formosa and Okinawa. Two American cruisers were torpedoed but were towed to port. Other carrier attacks swept the Japanese airfields on the Philippines. On October 19 and 20, American troops landed on the eastern coast of Leyte.

Japanese naval forces made a last desperate effort to block this landing. Three separate forces approached the Leyte area from Japan and from Singapore. They were first sighted on October 23, and American submarines sank several ships. The next day, American carrier planes attacked the first force, which was approach-

WORLD WAR II

ing the Leyte area from south of Mindoro Island. One new Japanese battleship was sunk, but the force did not stop. An attack by Japanese carrier aircraft on Halsey's fleet sank the light carrier *Princeton* and revealed that an enemy carrier force (the second Japanese force) was in the area. That evening this force was found approaching Luzon from the north. Most of the Third Fleet steamed north to meet it. The next day, Third Fleet aircraft sank two Japanese carriers as well as a number of other ships. This second Japanese force fled back to Japan.

On the night of October 24, the third Japanese force, made up of old battleships, cruisers, and destroyers, approached Leyte Gulf through the Surigao Strait between Leyte and Mindanao. Admiral Thomas Kinkaid's force of battleships, cruisers, and destroyers of the Seventh Fleet, which had been covering the Leyte landings, stood by to meet the Japanese. In the dark of the night, the Seventh Fleet ships, including two battleships which had been rebuilt after having been sunk at Pearl Harbor, wiped out almost the entire Japanese force.

But the first Japanese force still had to be accounted for. On the morning of October 25, this force came out into the open Pacific through San Bernardino Strait between Samar and Luzon. The Japanese vessels caught an almost helpless group of American escort carriers protected only by destroyers. The Japanese sank two escort carriers before aircraft from those carriers and from part of the Third Fleet carriers turned them back. But the Leyte landing had been saved, and the Japanese naval losses had been so great that the Japanese fleet was no longer a danger.

The Japanese realized that the battle for Leyte was the decisive battle for the entire Philippines. If Leyte were lost, American aircraft based there could control all the islands. So the Japanese poured in men from other parts of the Philippines. They also began on a large scale a new measure of desperation — the use of suicide planes, which they called *Kamikazes*. (See *KAMIKAZE*.) But none of these measures was able to drive out the Americans, and by December, Leyte was under complete American control.

Luzon. MacArthur moved swiftly to take the rest of the Philippines. American troops swarmed over Samar, and in December by-passed the other Central Philippines to land on Mindoro. On December 18, 1944, the Third Fleet met a typhoon which sank three destroyers and damaged other ships. But the fleet was soon back in action. On January 9, 1945, American troops landed on Luzon at Lingayen Gulf, 110 miles north of Manila. At the same time, Halsey's forces again attacked Formosa and entered the South China Sea to attack Hongkong, Canton, and Saigon in French Indo-China. They also nearly wiped out a large Japanese convoy moving northward toward Japan. The last Japanese life line between Japan and its southern empire had been cut.

Later landings at Subic Bay and at Nasugbu, south of Manila, allowed three American forces to drive toward Manila. The Japanese fought hard for the city and destroyed most of it. On February 17, paratroops landed on Corregidor, and by the end of the month Manila was largely cleared of Japanese. The fighting for the rest of Luzon continued until the end of the war. Landings



Photos: Coast Guard, U.S. Navy

THE WAR IN THE PACIFIC

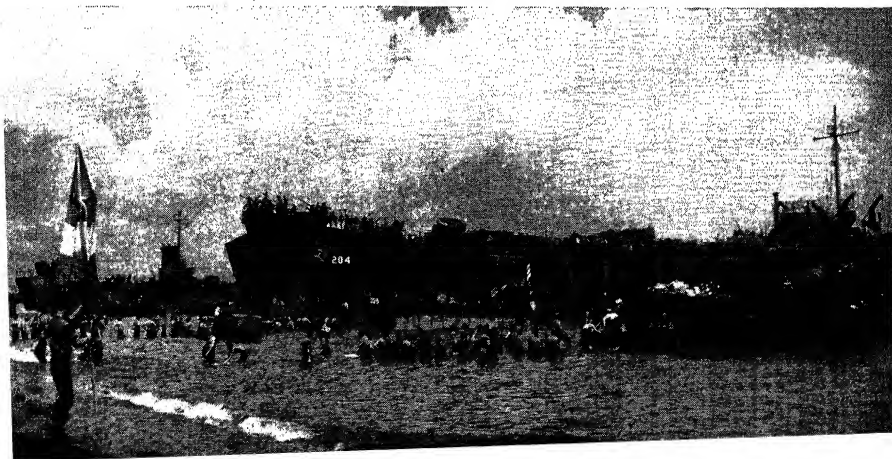
Pouring into Peleliu. A wave of Alligators, tough little cannon-carrying tanks that fight on land or water, churns toward the beach on Peleliu Island to storm the Japanese defenses. The landing-craft ship from which the Alligators were launched sends a protecting barrage of rocket fire toward the enemy on the coast.



Blasting Guam. A Marine howitzer, the short, powerful cannon that accounted for many Japs, goes into action shortly after the American invasion of Guam.



Taking Tinian. Marines wade ashore to the beach on Tinian Island, bound for the fighting front inland. Their landing craft may be seen in the background.



were made in the rest of the islands as operations permitted. British troops also landed in Borneo.

China and Southeast Asia

The weakest Allied defenses were in the Asiatic continent. The difficulty of supplying Allied forces as well as the geographical problems of the region slowed the Allied attack in Asia.

China. After 1938 the Japanese and Chinese forces battling in China were largely deadlocked. The Japanese had little desire to gain more territory than they already had, and they lacked the man power to carry out much wider campaigns. The Chinese lacked the supplies to carry out a successful counterattack. The Japanese occasionally raided the rich grain regions of Honan and Hunan provinces, but usually retired after destroying harvests.

But the United States in 1942, 1943, and 1944 had begun building up a fairly strong air force in China. Coolie laborers built airfields. Transport planes flew in more supplies over the "Hump," the dangerous air route across the Himalayas, than had ever been carried across the Burma Road before it was closed in 1942. Allied air attacks in China began to wear down the Japanese seriously. In 1944 the Japanese began a campaign to wipe out American bases. They drove south in Hunan Province, past Changsha to the railroad junction city of Hengchow. Then they turned southwest into Kwangsi Province where most of the major American airfields had been built. They captured the important bases of Liuchow and Kweiyang and turned northwest toward Kweichow Province. At one time they were within about 200 miles of the Chinese capital at Chungking. But their supply lines became too long, and they were forced to retreat. Before the end of the war, Chinese forces had regained most of the territory lost.

Burma. Ever since 1942, the Allies had hoped to be able to reopen the Burma Road to China. The Japanese troops were thinly spread through northern Burma because of the thick jungles, and small raiding parties had considerable success in making isolated attacks on Japanese units. But no very important campaign was decided upon until late in 1943. Then plans were made to drive through northern Burma so that a road could be built connecting the railway in northeastern India with the Chinese end of the old Burma Road. This road was named the Ledo Road. Later its name was changed to Stilwell Road. See **STILWELL ROAD**.

The campaign in northern Burma was a long, slow process of hacking through jungles and climbing steep mountains. But the campaigners found that they could also use the by-passing technique that had proved successful in the Pacific. Commando troops were trained in guerrilla warfare as part of the two groups of commando forces which had been operating in Burma behind Japanese lines since 1943, Wingate's Raiders and Merrill's Raiders (see **MERRILL'S RAIDERS**; **WINGATE'S RAIDERS**). They were sent by parachute or glider to key points along the path of advance to fight the Japanese in the rear while the main force attacked the Japanese from the front.

At the same time, Chinese troops under General Stilwell fought south to hold the Chinese end of the road. The two forces came together in late 1944. The first

truck convoys to China passed over the Ledo Road in late January, 1945.

Meanwhile, the Japanese had tried to cut the Ledo Road at its end in India. In March, 1944, they invaded India near Chittagong and Imphal. But they were held back by Indian troops until the heavy rains of the Indian summer, plus disease and lack of supplies, forced them to retreat. The British forces followed quickly on their heels and drove them steadily backward. On March 20, 1945, Mandalay was retaken, and on May 3, the Japanese gave up Rangoon.

The Final Campaign

By the first of 1945, it was clear to all fully informed people that Japan's defeat was certain. Many of the main Japanese bases had been taken. The Japanese navy had been sunk or driven into hiding. Much of the Japanese merchant marine had been sunk and nearly all Japanese sea lanes had been cut or were under constant attack. The Japanese air force had been cut down to the point that it offered scarcely any opposition to Allied aircraft. Japanese production was not able to keep pace with Japanese losses, while Allied production multiplied Allied forces by many times.

But the Allies were not sure that Japan could be forced to surrender without an invasion of the Japanese homeland. Already, Japanese defeats had caused some shake-ups in the Japanese government. Premier Tojo had resigned after the fall of Saipan. His successor quit office after the Allied landing on Okinawa. But Japanese propaganda still predicted victory, and apparently the Japanese people still believed victory was possible. In addition, most of the Japanese army was still intact, although several hundred thousand Japanese troops had either been killed or cut off in the series of Pacific island campaigns. So the Allies prepared for an invasion of Japan itself.

B-29 Raids. The first step in preparing for a landing in Japan was to bomb the Japanese homeland. The B-29 Superfortress bomber had been designed especially for this purpose. It was able to travel as much as 1,500 miles with a profitable bomb load and return. These planes were ready for action by the spring of 1944. They made their first test missions from India and China, bombing targets in Siam, Malaya, and Indo-China. The first B-29 raid on Japan was made on June 15, 1944, the same day American troops landed on Saipan. The B-29's flew from Chinese bases to bomb a steel plant at Yawata in western Japan. Raids from China on targets in western Japan, Formosa, and Manchuria continued at the rate of about one a week throughout the summer. But the long range made it impossible for the planes to carry very heavy bomb loads.

The chief B-29 raids were made from bases in the Marianas. As soon as Saipan, Tinian, and Guam had been captured, engineers went to work to prepare as many fields as possible for the giant bombers. Small raids on Japan began in late 1944 and built up in strength as the months went by. Various tactics were worked out to increase the bomb loads the B-29's could carry. Eventually they increased their load to as much as eight and ten tons. See **LEMAX**, **CURTIS EMERSON**.

By far the most effective B-29 attacks were the fire bomb raids. A special type of incendiary bomb was de-

veloped which spread flames rapidly and was very difficult to put out. Three major raids wiped out the heart of Tokyo. Most of Yokohama was destroyed in one attack. By the end of the war, the bombers had wiped out most of the industries in fifty-nine Japanese cities. General Carl Spaatz of the Pacific air force estimated that bombing attacks reduced Japanese aircraft production by 60 per cent and steel production by 15 per cent. In addition Japanese oil production was almost completely destroyed.

A fairly large number of B-29's were shot down in the first raids. But the pilots soon learned tactics to evade Japanese fighter aircraft and antiaircraft fire. In some of the later raids, as many as 600 B-29's took part in a single attack. They had protection from Allied fighters based on Okinawa and Iwo Jima. The planes could operate so freely that General Spaatz dared to warn in advance of the raids the residents of Japanese cities to be attacked. By the end of the war, 437 B-29's had been shot down in combat. This was a fairly low cost for the damage done.

Underseas Warfare. Japan's main life line was its merchant fleet. Without it, the island country could not hope to exist very long. The Japanese needed ships both to connect various parts of the empire and to provide coastal transportation. Allied submarines took a terrific toll of Japanese ships. At the end of the war, it was estimated that United States submarines had definitely sunk 167 Japanese warships and 1,089 merchant ships. The submarine warfare, along with air attacks on shipping, reduced Japanese merchant tonnage from a high of 7,000,000 tons in 1942 to only slightly more than 1,000,000 tons at the end of the war. Most of the ships left afloat were only small craft.

Iwo Jima. The B-29's were able to bomb Japanese cities and industries, but they could not protect forces invading Japan. Bases closer to Japan were needed to supply fields for fighter aircraft which could cover a landing. Such fields would also be useful in providing emergency landing fields for the B-29's. The first base selected for capture was Iwo Jima, a tiny volcanic island about halfway between Saipan and Tokyo. For nearly six months before a landing was made, the island was bombed or shelled almost daily. But the Japanese hurriedly set up underground defenses which made it very difficult and costly to capture the island. The landing on Iwo Jima was preceded by the first raids by carrier aircraft on Japan proper. Carrier planes also attacked Okinawa again. United States Marines landed on Iwo Jima on February 19, 1945, and finally wiped out Japanese resistance on March 16. Three airfields were soon put into operation on the island. See Iwo Jima.

Okinawa. The second base close to Japan chosen for seizure was Okinawa, the main island in the Ryukyu group. Iwo Jima offered a base for attacking eastern Japan. Airfields on Okinawa could launch planes to cover western Japan. Capture of the island would also cut off Formosa from Japan, give Allied aircraft control of the China Sea, and give a base for a possible landing on the coast of central China. Before the landing on Okinawa, carrier planes attacked Japanese airfields on the western home island of Kyushu. Planes and ships bombarded Okinawa for nine days before the invasion.

The landing took place on April 1, 1945. Opposition at first was fairly light. Marines assigned to take the north half of the island quickly overran it. But the infantry attacking the south half of Okinawa soon ran into stubborn opposition. American troops finally captured the island on June 21, after suffering nearly 45,000 casualties. Kerama Retto and several other small islands near Okinawa were also taken during this period.

One of the great problems of the Okinawa campaign was the Japanese use of mass attacks by suicide planes. More than 5,000 Japanese aircraft dived at Allied targets, principally warships. Few ships were sunk, but many, especially destroyers, were put out of action, and the navy suffered nearly 10,000 casualties.

The Victory over Japan

After the Okinawa campaign, the war against the Japanese homeland rapidly speeded up. All branches of the armed forces worked together to destroy the Japanese ability to continue to fight.

In the Air. Both B-29's and smaller planes ranged over Japan in daily raids of as many as 1,000 planes. The B-29's systematically bombed and burnt out Japan's major cities. Smaller planes attacked shipping and rail lines.

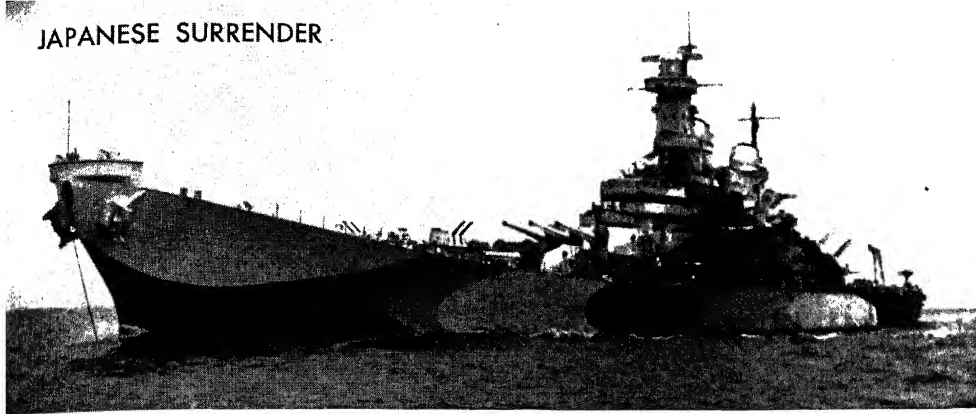
Under the Seas. American submarines, which had cut off most of Japan's sea lanes, moved their operations largely to Japanese coastal waters. They sank or shelled many Japanese ships within sight of Japan itself. Mines laid by submarines or dropped in coastal waters by mine-laying aircraft also helped to destroy the Japanese merchant fleet.

On the Seas. The Third Fleet moved into Japanese waters in July. In June, the last attempt by the Japanese fleet to operate had ended in disaster with Japan's largest battleship, the *Yamato*, sunk by carrier aircraft. Third Fleet aircraft hunted down the rest of Japan's navy at its bases at Kure and Yokosuka and knocked most of the ships out of action. Carrier aircraft also ranged off the islands, attacking industries, shipping, and rail lines. Surface ships moved up within a few miles of Japan to bombard such industrial cities as Hamamatsu and Kamaiishi. The British Pacific fleet also joined with the Third Fleet to operate against Japan.

Propaganda War. The Pacific war involved the use of much less propaganda than did the European side of the conflict. Broadcasts were of little value, because Japan had few short-wave radios. The Japanese broadcast frequently to the Allied countries, but such programs as those of the notorious woman known as "Tokyo Rose" were more amusing than convincing. In the last months of the war, Allied propaganda against Japan became more important. B-29's dropped millions of leaflets. Radio stations on Saipan and other islands broadcast programs which could be picked up by Japan's long-wave receiving sets. The short-wave broadcasts of Captain Ellis Mack Zacharias seemed to attract the attention of high Japanese officials.

The Potsdam Declaration. On July 26, 1945, the leaders of the United States and Great Britain meeting at Potsdam issued the following statement, which also had the approval of China. Stripped to its essentials, the document reads as follows:

JAPANESE SURRENDER



The U.S.S. Missouri, a 45,000-ton battleship from which Admiral William F. Halsey commanded the victorious Pacific Fleet, was designated by President Truman as the scene of the

first Japanese surrender in modern history. The *Missouri* was anchored in Tokyo Bay for the ceremonies, held on September 2, 1945. High officers of the Allied nations took part.



General MacArthur Speaks. After formal announcement of Japan's surrender, General Douglas MacArthur spoke to the Allied officers assembled on the main deck of the U.S.S. *Missouri*.



Japan Surrenders. Japanese Foreign Minister Shigenitsu signs the surrender document on board the *Missouri*. General MacArthur, standing near table, looks on.



"So Sorry!" Former Japanese guards at the notorious Ofuna prison camp near Yokohama bow low as their American prisoners leave after the Jap surrender.



Ruined Yokohama. This heap of rubble was on business section of Japan's fifth largest city. It was by incendiary bombs from United States planes.

We, the President of the United States, the President of the National Government of the Republic of China and the Prime Minister of Great Britain, representing the hundreds of millions of our countrymen, have conferred and agreed that Japan shall be given the opportunity to end this war.

The time has come for Japan to decide whether she will continue to be controlled by those self-willed militaristic advisers whose unintelligent calculations have brought the empire of Japan to the threshold of annihilation, or whether she will follow the path of reason.

The following are our terms. We will not deviate from them. There are no alternatives. We shall brook no delay.

There must be eliminated for all time the authority and influence of those who have deceived and misled the people of Japan into embarking on a world conquest. We insist that a new order of peace, security and justice will be impossible until irresponsible militarism is driven from the world.

Until such a new order is established and until there is convincing proof that Japan's war-making power is destroyed, points in Japanese territory to be designated by the Allies shall be occupied to secure the achievement of the basic objectives we are here setting forth.

The terms of the Cairo declaration shall be carried out and Japanese sovereignty shall be limited to the Islands of Honshu, Hokkaido, Kyushu, Shikoku and such minor islands as we determine.

The Japanese military forces, after being completely disarmed, shall be permitted to return to their homes with the opportunity to lead peaceful and productive lives.

We do not intend that the Japanese shall be enslaved as a race or destroyed as a nation, but stern justice shall be meted out to all war criminals, including those who have visited cruelties upon our prisoners. The Japanese Government shall remove all obstacles to the revival and strengthening of democratic tendencies among the Japanese people. Freedom of speech, of religion and of thought, as well as respect for the fundamental human rights, shall be established.

Japan shall be permitted to maintain such industries as will sustain her economy and permit the exaction of just reparations in kind, but not those which would enable her to rearm for war.

To this end, access to, as distinguished from control of, raw materials shall be permitted. Eventual Japanese participation in world trade relations shall be permitted.

The occupying forces of the Allies shall be withdrawn from Japan as soon as these objectives have been accomplished and there has been established, in accordance with the freely expressed will of the Japanese people, a peacefully inclined and responsible government.

We call upon the Government of Japan to proclaim now the unconditional surrender of all Japanese armed forces, and to provide proper and adequate assurances of their good faith in such action. The alternative for Japan is prompt and utter destruction.

In July, the Japanese had already attempted to make a negotiated peace by acting through the Soviet Union. The Allies insisted on unconditional surrender. Japan at first said officially that it would ignore the Potsdam Declaration. But events moved swiftly.

The Atomic Bomb. On August 6, 1945, the first atomic bomb to be used in warfare was dropped on Hiroshima, a city of about 343,000 persons in western Japan. Most of the city was wiped out in the single blast. The effect on the already staggered Japanese was stunning. President Harry S. Truman once again called on Japan to surrender. When this demand was ignored,

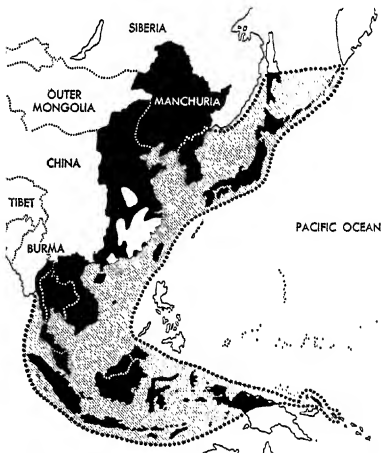
a second atomic bomb was dropped on August 9 on Nagasaki, a seaport and arms-manufacturing city on Kyushu.

Soviet Union Enters War against Japan. The day before the Nagasaki bombing, the Soviet Union declared war on Japan and invaded Manchuria. At the Yalta Conference in February, 1945, Premier Stalin had promised the Soviet entry into the Pacific war within three months after the surrender of Germany. The Soviets declared war exactly three months to the day after Germany gave up.

The Red Army drove into Manchuria from three directions and swiftly pushed the Japanese back. Much of Japan's famed Kwantung Army had already been taken from Manchuria to build up defenses in the Philippines and elsewhere, and the Manchurian defenses were weak. Soviet troops also invaded northern Korea.

Japan Surrenders. On August 10, the Japanese Government asked the Allied powers if acceptance of the terms of the Potsdam Declaration would require Emperor Hirohito to give up his throne. The Allied governments replied that he would not be asked to leave the throne, but that his fate would finally be up to the Japanese people themselves. The Japanese Government then agreed to accept the Potsdam terms and to surrender unconditionally. The Allies accepted the terms on August 14 Washington (D.C.) time, which was August 15 Tokyo time. Emperor Hirohito told the Japanese people by radio that Japan had lost the war.

The Japanese surrender caught the Allied powers



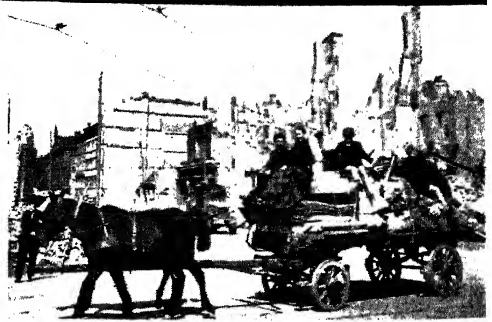
The Japanese Empire Near the End of World War II

almost unprepared for carrying out the operation of occupying Japan. Plans had been made for landing in Kyushu in November, and troops and supplies had to be shifted in a hurry. The Allies also had some fears that the hotheaded Japanese militarists might refuse to obey the emperor's orders and fight the occupying forces. Members of the imperial family visited various war fronts to counsel with Japanese army leaders.

But the Allies moved as quickly as possible. General MacArthur was named Supreme Commander for the



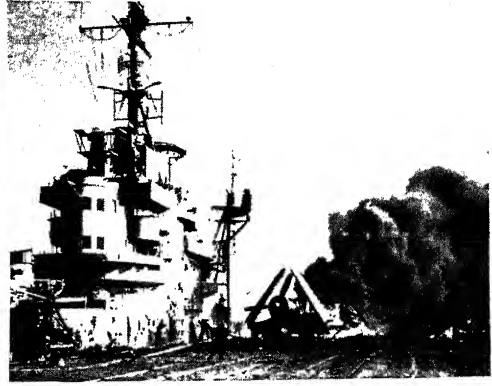
Unter den Linden. This once beautiful street was wrecked in World War II. Russians direct the clearing, which is being done by German civilians.



Returning to Magdeburg. Civilians come home after the unconditional surrender of Germany. Their high-piled cart is outlined against the devastated town.



Potsdam Conference. Seated, Prime Minister Attlee; President Truman; Generalissimo Stalin. Standing, Admiral Leahy; Ministers Bevin, Byrnes, and Molotov.



A "Kamikaze" Attack. Japanese suicide plane, one of those which tried vainly to avert Japan's defeat, crashed on the deck of this British carrier off the Sakishima Islands, near Japan.



Atomic Bomb. Smoke towered 20,000 feet above Nagasaki, three minutes after the



Manila Bound. Japanese envoys at Ie Shima on their way to discuss terms with General MacArthur.

Photos: Acme from U.S. Signal Corps; Acme; British Combine; International News

Allied Powers to accept the surrender and to direct the occupation. Allied fleets moved into Japanese home waters and anchored on August 27. Allied air-borne troops arrived in Japan during the next few days, and on September 2 Tokyo time, the Japanese signed the formal surrender aboard the battleship *U.S.S. Missouri* anchored in Tokyo Bay. The occupation proceeded in an orderly fashion almost without incident.

Under MacArthur's direction, American troops occupied the Japanese home islands. American troops also landed in China and took control of southern Korea. Japanese troops surrendered separately in other war areas. The Japanese commander in China surrendered to the Chinese at Nanking. Chinese troops temporarily occupied northern French Indo-China and took over the island of Formosa permanently.

Soviet troops remained in occupation of Manchuria and northern Korea, and took control of southern Sakhalin Island and all the Kurile Island chain.

In southeastern Asia, British troops temporarily occu-

pled Siam and southern Indo-China. Japanese troops in Malaya surrendered to Admiral Lord Louis Mountbatten. British troops also landed in parts of the Netherlands Indies to maintain order until Dutch troops could arrive.

Under the terms of the Potsdam Agreement, the Allies began immediately to transport Japanese troops and civilians back to Japan. This enormous task was finished in about one year, except for the Japanese who had been in Manchuria and northern Korea.

The Soviet Union had not joined in the Potsdam Declaration, and had removed many Japanese troops from Manchuria to the Soviet Union. These began to be sent back to Japan in small groups late in 1946. Under the terms of the Chinese-Soviet treaty of August, 1945, Soviet troops began to withdraw from all of Manchuria, except Dairen and Port Arthur, late in 1945. Chinese troops came in, although there was much conflict between Chinese nationalist and Chinese Communist troops.

The United States in World War II

Throughout the war, America was a united country. Persons and groups put aside their differences to join in the one great common purpose.

When World War II began in Europe, Americans had been far from united. Most persons clearly hoped Hitler could be defeated, but some in all parts of the country disagreed. A fairly large group had come to admire Hitler and Mussolini for their "efficiency." Hitler's ideas about the superiority of the mythical "Nordic race" were shared by some Americans. Some persons saw in Hitler a protection against Communism. President Roosevelt clearly opposed the Axis powers, and a group of Americans opposed the President so bitterly that they favored anything he protested.

Isolation versus Intervention. When Hitler's troops marched into Poland, American opinion fell into three groups. By far the largest group was made up of persons who hoped the Allies would win, but hoped also that America could keep out of the war.

A much smaller group included two kinds of persons who came to be known as *isolationists*. One kind wanted America to stay out completely, sell no goods to either side, and if need be give up foreign trade altogether in order to stay neutral. The other kind opposed any aid to either side, but wanted to continue foreign trade and uphold "freedom of the seas."

The *interventionists* wanted America to take sides. A few wanted to join the Allies. Many more wanted to help them with war materials and supplies.

In May, 1940, interventionists organized the "Committee to Defend America by Aiding the Allies." In 1941, after Hitler had won a string of victories, a society called "Fight for Freedom" began urging American entry into the war. On the isolationists' side, the "America First Committee" argued that helping Britain would drag America into the war.

Aid to the Allies. In October, after Hitler had attacked Poland, President Roosevelt summoned a special session of Congress which repealed the law against selling munitions to countries at war. The

British and French governments then placed orders for aircraft and munitions with American manufacturers.

After the fall of France and the loss of British war equipment at Dunkerque, the United States Government, through private agencies, sold to Great Britain 600,000 rifles, 80,000 machine guns, 800 field guns, and a large supply of ammunition. For a few weeks, these weapons were about all that Great Britain had.

During the summer of 1940, President Roosevelt arranged with American manufacturers of heavy bombers that half the new planes should be sold to Great Britain and the other half to the American Government.

The Arsenal of Democracy. By the end of 1940, it was clear that British funds for purchases on a "cash and carry" basis would soon be gone. China, in a death struggle with Japan, had already run out of cash. The Johnson Act of 1934 prohibited private loans and credits in the United States to foreign governments which had failed to pay World War I loans.

President Roosevelt proposed, on December 29, 1940, that the United States become the "arsenal of democracy." The United States, he said, should supply the materials of war by some other means than by loans and purchases. Within two weeks, the Lend-Lease Bill was offered to Congress. After a bitter fight, the bill passed both houses and became law on March 11, 1941. Under this measure, the President could sell, lend, or lease weapons, munitions, aircraft, and ships to any government whose defense he considered "vital to the defense of the United States."

The passage of this act was a turning point in American foreign policy. The "arsenal" idea definitely joined the United States to the cause of the Allies.

The passage of the Lend-Lease Act pointed to the end of American neutrality. The President was later given power to arm American merchantmen. On April 1, 1941, the President ordered the Red Sea opened to American shipping, in order to permit delivery of Lend-Lease supplies to British forces in the Near East. The

navy was directed to extend its patrol of the inter-American "safety zone" eastward to the middle of the Atlantic. On July 18, the navy was instructed to keep the North Atlantic sea lanes open as far as Iceland. Finally, in September, the navy began to convoy Allied merchant ships from American ports to Iceland, where British warships took over the escort of the vessels.

Clashes with Germany. The Hitler-controlled press greeted these changes in the neutrality policy with personal insults hurled at President Roosevelt. Sabotage by Nazi and Fascist agents, toward the end of March, 1941, led the United States to seize German and Italian ships in American ports and to intern their crews. Later, these and French ships in American ports were taken over by the United States Maritime Commission.

The sinking of the American freighter *Robin Moor* by a German submarine in the South Atlantic outside the war zone on May 31 was followed by an order freezing all German and Italian assets in the United States. German and Italian consulates and propaganda agencies were ordered closed, and Axis agents were forced to leave the country. An encounter between the United States destroyer *Greer* and a German submarine on September 4 led to the President's "shoot on sight" order of September 11. By December, 1941, the United States had moved from strict neutrality to playing an important part on the Allied side.

Economic Defense Board. President Roosevelt established an Economic Defense Board on July 30, 1941. Its purpose was to develop "policies, plans, and programs designed to protect and strengthen the international economic relations of the United States in the interest of national defense." After the United States entered the war, it became the Board of Economic Warfare. In 1943 it became part of the Office of Foreign Economic Administration.

The Good Neighbor Policy. At the Lima Conference of 1939, Secretary of State Cordell Hull pushed for a declaration that the American republics would stick together for common defense. In case of danger, it was agreed that the foreign ministers of the republics should meet for consultation. In September, 1939, a conference of foreign ministers was held at Panama City. This conference marked off a "safety zone" around the American continents south of Canada. But the warring nations paid little attention, and naval battles were fought within the zone.

The United States sought the good will of the Latin American republics by buying as much as possible of their surplus products. To provide Latin American countries with the dollar exchange needed for their imports, the Export-Import Bank gave credits to the central banks of Argentina, Brazil, Colombia, Peru, and Uruguay. American imports from Latin America were more than doubled. The United States signed the Inter-American Coffee Agreement of 1940 with fourteen Latin American states. This agreement gave each producing country a yearly quota for export to the United States. These plans drew all the Latin American countries except Argentina and Chile into a solid group.

Export Licenses and Embargoes. Another form of economic warfare was carried on through the use of export licenses and embargoes. A National Defense Act of July

WORLD WAR II CASUALTIES

The table is compiled from official sources. Except for the United States, all figures are approximations.

Military Casualties

United States	Killed	Wounded	Missing
Army.....	307,554	651,911	1,424
Navy.....	20,237	55,408	118
Marine Corps....	24,576	24,617	9,372
Coast Guard.....	820	213	83
TOTAL.....	353,187	732,149	10,997

UNITED NATIONS

	Killed
United States.....	353,187
Great Britain.....	400,000
Soviet Union.....	3,000,000
Free France.....	167,000
China (since Jan., 1942).....	250,000
Poland.....	125,000
Other United Nations.....	138,000
TOTAL United Nations.....	4,433,187

AXIS

Germany.....	3,250,000
Italy.....	200,000
Japan.....	1,500,000
Other Axis Nations.....	225,000
TOTAL Axis Nations.....	5,175,000
TOTAL All Nations.....	9,608,187

Civilian casualties are believed to total from 12,000,000 to 15,000,000. But casualty figures on Chinese civilian deaths were never kept accurately, and Japanese civilian casualty figures were destroyed in an air raid. British civilian casualties total about 145,000, plus 23,381 deaths of merchant seamen. Polish civilian casualties may reach as much as 10,000,000. For the figures on the number of Jews killed in concentration camps and elsewhere, see the table with the article Jew.

2, 1940, gave the President power to license or prohibit the export of materials necessary to national defense. The President used this power against Japan.

After 1937 Japan had increased its purchases of cotton, petroleum, gasoline, scrap iron, machinery, and aircraft equipment in the United States. The sale of Japanese silk in the United States created credits for the purchase of these war materials. The Chinese people resented this "death" trade. A growing public opinion in the United States thought it should be stopped. On July 1, 1938, the Department of State applied a "moral" embargo against the exportation of aircraft to Japan.

On July 31, 1940, the export of aviation gasoline above 86 octane was limited to Western Hemisphere nations and Great Britain. This amounted to an embargo upon high-grade gasoline for Japan. In September, the export of iron and steel scrap was forbidden. In May, 1941, all licenses for the shipment of scrap rubber to Japan were revoked, or taken away.

Freezing Credits of Foreign Countries. On June 14, 1941, after several Nazi submarine attacks on American shipping, the President ordered the freezing of all the American assets of Germany, Italy, and the occupied countries of Europe. A month later, Japanese credits in the United States were frozen. These orders ended trade with the Axis powers.

Blacklisting Axis Firms. Shut off from the markets of the United States, the Axis powers tried to get much-needed materials through Latin America. German, Italian, and Japanese firms in Argentina, Chile, Brazil, Colombia, Cuba, Costa Rica, Guatemala, and other countries, bought war supplies for the Axis. By a Presidential proclamation of July 17, 1941, these persons and firms were named in a black list. Trading with the enemy was thus forbidden to American firms.

Arming the Nation

Plans for Defense. The United States began to rearm even before the outbreak of the war in Europe. In 1938 Congress had authorized huge expenditures for the armed forces, including \$1,156,000,000 for the navy and \$656,000,000 for the army. This expansion was speeded up when war broke out in the fall of 1939.

Early in 1940 the American public felt secure behind the protection of the Atlantic and Pacific oceans. But this confidence melted away when the Nazis swept across The Netherlands and Belgium, rolled through France, and threatened to invade Great Britain.

On July 10, 1940, Congress granted \$4,800,000,000 for defense purposes. By the end of the year, \$28,000,000,000 more had been voted. For several years, the navy had been massed in the Pacific Ocean. Now Congress was ready to build a two-ocean navy at a cost of \$7,000,000,000.

Selective Service. In the summer of 1940, General George C. Marshall, Army Chief of Staff, reported that the Americas were in danger of invasion. He also stated that the country could not be defended without an army raised by conscription, or draft. Never before had Congress drafted soldiers in time of peace. The Selective Training and Service Act became law on September 16, 1940. About 650,000 men were inducted into the service by July, 1941, and about one million by January 1, 1942.

New Naval Bases. On September 3, 1940, in return for fifty over-age destroyers, the United States received from Great Britain the right to lease naval and air bases in Newfoundland, British Guiana, Bermuda, the Bahamas, Jamaica, Saint Lucia, Trinidad, and Antigua.

Defense of the Americas. The conquest of The Netherlands and France in 1940 raised the question of what would happen to their colonies in the Western Hemisphere. The United States warned Germany and Italy against trying to seize these possessions. The Havana Conference in July, 1940, empowered the American nations to take over any possession of a European power in the Western Hemisphere that was in danger of being seized by a non-American power. With the consent of The Netherlands government in exile, the United States sent a number of troops to Dutch Guiana in November, 1940.

Loans from the Export-Import Bank and Lend-Lease appropriations were used to strengthen both the military and the economic positions of the Latin-American republics. Credits were advanced to Mexico, Brazil, and Uruguay for the construction of naval and air bases, with the understanding that these bases might be used if necessary by the United States and other American states. In January, 1941, a North American military

and aviation mission helped Brazilian military authorities strengthen Brazil's defenses.

Co-operation between the United States and Canada was close. An American-Canadian Permanent Joint Board on Defense, formed in August, 1940, drafted plans for the common defense of North America. In May, 1941, a Materials Co-ordinating Committee was created, and the two countries practically pooled their resources for defense and aid to the Allies. The United States established a wartime protectorate over Greenland in April, 1941, and over Iceland in July of the same year.

National Defense Organization. On May 29, 1940, the President appointed the National Defense Advisory Commission. This commission worked out the policy to be followed by the army and navy in buying equipment.

Problems of plant expansion, stock piles, and priorities were highly complicated. The settlement of such questions was handed over to the Office of Production Management, headed by a board consisting of a director, an associate director, and the Secretaries of War and the Navy. Until January, 1942, the OPM was responsible for production, purchasing, and priorities. Later its powers were given to the War Production Board.

On April 11, 1941, the President created the Office of Price Administration. This office was to hold ceilings on prices and prevent inflation. Congress passed the Emergency Price Control Act, giving power to OPA, on January 30, 1942.

Home Defense Measures

Aid to China. After 1938 the relations between the United States and Japan became steadily worse. The United States began to give more help to China. A credit of \$25,000,000 was extended in December, 1938, and another of \$100,000,000 in 1940.

Internment of Dangerous Aliens. In 1940 Congress passed an Alien Registration Act which required the listing and fingerprinting of all noncitizens in the United States. Later, all enemy aliens had to get certificates of identification. At the outbreak of the war, there were 4,921,452 aliens in the United States. Of this number, about 1,100,000 became *enemy aliens* because they were citizens of Germany, Italy, or Japan. In the first month of the war, the Federal Bureau of Investigation arrested and interned only 2,971 aliens. Any interned alien could seek his release by appearing before local Enemy Alien Hearing Boards.

Many restrictions were placed on enemy aliens. They were not allowed to carry weapons or to have short-wave radio sets. They could not have cameras, codes, or ciphers. They could not travel in aircraft without government permission. Most enemy aliens in the United States were anti-Axis and pro-American. In October, 1942, restrictions on Italian-born aliens were eased, and Italians were even permitted to join the United States Citizens Defense Corps.

Japanese Removed from Coast Areas. When the United States entered the war, there were 40,869 Japanese enemy aliens and 71,484 *nisei*, or American-born Japanese, in California, Oregon, and Washington. Some of them lived near airplane factories and defense installations. Under the Constitution, the *nisei* were citizens of the United States. Many of them already had been

inducted into the army. But Pearl Harbor had aroused public opinion against all Japanese in the United States. In February, 1942, the President authorized the Secretary of War to mark off military areas, and to provide for moving American-born Japanese as well as enemy-aliens out of these areas. The President created the War Relocation Authority on March 18. Under this office, camps for displaced Japanese were set up in Utah, Colorado, California, and Arkansas.

Spies and Saboteurs. From the beginning of war, the Federal Bureau of Investigation and other law-enforcing agencies were on the alert to detect fifth columnists and saboteurs. Much secret, or undercover, work was done. In June, 1942, eight German saboteurs were caught. Four had been landed by a German submarine on Long Island, N.Y., and four had reached the Florida coast by another submarine. The President appointed a military commission to try the prisoners. Six were executed and two were imprisoned for life. Relatives and friends who had knowingly aided them were later convicted of treason, and three were sentenced to death.

A Democracy in Action

Total war called for increased activity by every one of the ten Federal departments, especially the departments of State, Treasury, War, Justice, Navy, and Agriculture. In addition, the war effort brought about the creation of many entirely new agencies.

Emergency War Agencies. Under various acts of Congress and executive orders issued by the President, many emergency boards and agencies were set up. The Office for Emergency Management was established in May, 1940. The boards and offices established within the OEM included:

Board of War Communications. Set up on September 24, 1940, to co-ordinate all branches of communication to the war effort.

National War Labor Board. Set up on January 12, 1942, to handle labor disputes which were not promptly settled in the ordinary ways.

Office of the Alien Property Custodian. Established on March 11, 1942, to control foreign-owned property, especially of an enemy government or enemy alien.

Office of Civilian Defense. Created on May 20, 1941, to assure effective co-ordination of Federal relations with state and local governments in the war program, particularly in the protection of the civilian population.

Office of the Co-ordinator of Inter-American Affairs. Created on July 30, 1941, with power to: (1) co-ordinate with other American nations the cultural and commercial relations of the United States affecting hemispheric defense; (2) formulate and execute, in co-operation with the Department of State, in such fields as the arts and sciences, education, travel, radio, newspapers, and motion pictures, programs to promote national defense and strengthen the bonds between the nations of the Western Hemisphere; (3) recommend and execute programs in the commercial and economic fields for the well-being of the Western Hemisphere.

Office of Defense Transportation. Created on December 18, 1941, to try to make the best use of transportation facilities to assure the orderly and speedy movement of men, materials, and supplies for war and home needs.

Office of Economic Stabilization. Created on October 3, 1942, to work out an over-all national economic policy. It involved control of civilian purchasing power, prices, rents, wages, salaries, rationing, and subsidies, in order to: (1) keep down the cost of living; (2) cut down need-

less movement of labor from one business, industry, or region to another; (3) help the prosecution of the war.

Office of Foreign Economic Administration. Created on September 25, 1943, to absorb the Offices of Economic Warfare, Lend-Lease Administration, and Foreign Relief and Rehabilitation Operations.

Office of Lend-Lease Administration. Created on October 28, 1941, to carry out the powers of the President under the Lend-Lease Act of March 11, 1941.

Office of Scientific Research and Development. Created on June 28, 1941, to provide for research on scientific and medical problems relating to national defense. The greatest achievement of this agency was the development of the atomic bomb.

Office of War Information. Created on June 13, 1942, in order to: (1) make use of newspapers, radio, and motion pictures, in developing information programs making clear the progress of the war effort and the war policies and aims of the Government; (2) co-ordinate the war information activities of all Federal departments and agencies in order to assure a consistent flow of war information to the public at home and abroad; and (3) approve all proposed radio and motion-picture programs sponsored by Federal departments and agencies. The OWI was to collaborate with the Director of Censorship to suppress information which would give aid to the enemy.

Office of War Mobilization. Established on May 27, 1943, to provide for more effective co-ordination of the war activities of the nation on the home front, especially in the use of its man power and resources.

War Manpower Commission. Created on April 18, 1942, to assure the most effective mobilization and use of the nation's man power.

War Production Board. Created on January 16, 1942, to direct procurement and production, including purchasing, contracting, construction, conversion of manufacturing plants, and plant expansion. The WPB also controlled priorities and allocations of materials used in war production, thus replacing the Office of Production Management.

War Relocation Authority. Created on March 18, 1942, to provide for removing and relocating American citizens of Japanese descent from military areas.

War Shipping Administration. Created on February 7, 1942, in order to purchase, charter, requisition, and operate ocean vessels under the flag or control of the United States, except vessels of the army and navy and the coast guard.

Another group of agencies, not under the Office for Emergency Management, was definitely connected with the war effort. The war agencies not under OEM included:

National Housing Agency. Created on February 24, 1942, by the President under the First War Powers Act of 1941. Among other functions, the NHA was to determine the need for housing war workers in areas where there were shortages of houses. The NHA directed three units: The Federal Home Loan Bank Administration; the Federal Housing Administration, and the Federal Public Housing Authority.

Office of Censorship. Created on December 19, 1941, to censor communications by mail, cable, and radio outside the United States.

Office of Price Administration. The OPA was created by an executive order on April 11, 1941, and by the Emergency Price Control Act of January 30, 1942. Its purpose was to stabilize prices and to prevent speculation and unjustified rises in the prices of commodities and in rents.

Petroleum Administration for War. Created on December 2, 1942, to regulate all operations of the petroleum industry.

President's War Relief Control Board. Created on July 25, 1942, to take charge of refugee relief and of the relief and welfare of the United States armed forces and dependents.

Selective Service System. Created under the Selective Training and Service Act of September, 1940, to administer the conscription system. In December, 1942, it was placed under supervision of the War Manpower Commission.

War Food Administration. See AGRICULTURE, DEPARTMENT OF.

The international joint war committees were:

Joint Economic Committees—United States and Canada. Created on June 17, 1941, to study and report means of economic co-operation.

Joint War Production Committee—United States and Canada. Established on November 5, 1941, to co-ordinate the production of defense materials by the two countries.

Material Co-ordinating Committee—United States and Canada. Established on May 14, 1941, for the exchange of information regarding strategic raw materials.

Permanent Joint Board on Defense—United States and Canada. Established on August 17, 1940, to study defense of the northern half of the Western Hemisphere.

Combined Chiefs of Staff—United States and Great Britain. Created on February 6, 1942, to insure complete co-ordination of the war effort of the two countries.

Combined Food Board—United States, United Kingdom, and Canada. Established jointly on June 9, 1942, to plan for the best use of the food resources of the Allies.

Combined Production and Resources Board—United States, Great Britain, and Canada. Created on June 9, 1942, to integrate the production programs of the United States and Great Britain. Canada was represented on this board after November 10, 1942.

Combined Raw Materials Board—United States and Great Britain. Established on January 26, 1942, to plan for using the joint resources of the two countries and of the United Nations.

Combined Shipping Adjustment Board—United States and Great Britain. Established on January 26, 1942, to harmonize the work of the British Ministry of War Transport and the War Shipping Administration of the United States.

Munitions Assignments Board—United States and Great Britain. Created on January 26, 1942, to advise on all assignments of munitions to the United States, Great Britain, and other members of the United Nations.

Joint Mexican-United States Defense Commission. Established on January 12, 1942.

Inter-American Defense Board. Established in accordance with a resolution of the Conference of the Foreign Ministers at Rio de Janeiro in January, 1942, to recommend to the governments of the American republics measures necessary to the defense of the Western Hemisphere.

Pacific War Council. Established on March 30, 1942, to consider the joint war effort. Diplomatic representatives from the United States, Great Britain, China, The Netherlands, Australia, Canada, New Zealand, and the Commonwealth of the Philippines met from time to time at the White House.

After the Allies began to reconquer territory from the Axis, another agency was set up to look after affairs in the liberated areas. This was the:

Office of Foreign Economic Co-ordination. Established on June 24, 1943, under the Department of State. This agency was authorized to co-ordinate all economic activities in the areas liberated from the Axis. It took the place of the Board of Economic Operations and of the Office of Foreign Territories in the administration of

nonmilitary matters in connection with the Allied occupation.

Husbanding Raw Materials

Modern warfare calls for huge quantities of raw materials to manufacture war equipment. The United States had vast resources of cotton, iron, coal, chemicals, petroleum, copper, sulfur, zinc, lead, and phosphates. Wool, nitrates, and bauxite for making aluminum were also plentiful. But some strategic raw materials had to be imported.

Strategic and Critical Materials. The Army and Navy Munitions Board, in March, 1940, announced the strategic and critical materials necessary for national defense, which should be conserved and controlled. The fourteen *strategic* materials were: antimony, chromium, coconut shell char, manganese, manila fiber, mercury, mica, nickel, quartz crystal, quinine, rubber, silk, tin, and tungsten. The fifteen *critical* materials included aluminum, asbestos, cork, graphite, hides and skins, iodine, kapok, opium, optical glass, phenol, platinum, tanning materials, toluol, vanadium, and wool.

Mobilization of Raw Products. Even before the outbreak of war, farsighted experts had urged the building of stock piles, or reserves, of strategic and critical materials. The Navy Department used \$3,500,000 of its annual appropriation for this purpose in 1938. Congress appropriated \$100,000,000 for stock piles in 1939. The financing of this enterprise was entrusted to the Reconstruction Finance Corporation in 1940. This office then created three subsidiaries: the Rubber Reserve Company, the Metals Reserve Company, and the Defense Supplies Corporation, each headed by the Federal Loan Administrator. In April, 1942, the final responsibility for the importation of commodities required for the war effort rested in the Board of Economic Warfare, whose policies guided the RFC. In July, 1943, President Roosevelt transferred both this board and the war-financing powers of the RFC to the Office of Economic Warfare (later the Office of Foreign Economic Administration).

Priorities and Allocations. Requirements of national defense had to come before those of private enterprise. The National Defense Act of 1940 provided that all army and navy contracts and orders should take priority over deliveries for domestic or export purposes. In October, 1940, the National Defense Advisory Commission established the Priorities Board. Its duties were given to the Supply Priorities and Allocation Board in August, 1941. The War Production Board, established on January 16, 1942, was assigned the determination of all priorities and allocations.

Substitutes and Synthetics. The loss of imports from the Orient was a challenge to American scientists. Substitutes and synthetics were found for needed materials. Already rayon and nylon had captured part of the market for silk. In April, 1942, the Treasury released 40,000 tons of silver which were used in place of copper for electrical conductors in industrial electric furnaces. The new drug, atabrine, was developed as a substitute for quinine. Milkweed floss took the place of kapok.

The rubber shortage proved to be the most serious lack. About 760,000 tons of rubber consumed in 1941

had reduced the stock piles to a dangerously low level. Efforts to encourage rubber plantations in Brazil were undertaken and an appropriation was made for raising guayule, a rubber-yielding shrub, in the United States. In 1941 the Rubber Reserve Company started the construction of plants to produce a synthetic rubber called Buna-S, from petroleum, with a total production of 40,000 tons per year. (See RUBBER.) Immediately after Pearl Harbor, this amount was increased to 400,000 tons per year. On September 15, the President appointed a National Rubber Administrator.

In 1942, campaigns for the collection of scrap metal and scrap rubber, in which the public schools and civic organizations took part, yielded large quantities of materials for war production.

The Battle of Production

The United States had now become the arsenal of democracy. It had to produce munitions, guns, tanks, and aircraft not only for American troops, but also for the armies and navies of the Allies.

Conversion and Expansion of Plants. The sudden requirements of war production called for the expansion of factories already engaged in the manufacture of munitions, weapons, aircraft, and ships. Private enterprise had been unwilling to expand. With the return of peace, a plant built for the manufacture of munitions has little commercial value. In 1939 the British Government was compelled to finance the expansion of American plants in order to secure prompt filling of orders. This method was adopted by the United States Government.

Conversion of plants was also necessary. For example, plants which manufactured vacuum cleaners were converted to make machine guns. Automobile factories were changed over to build engines and fuselages for airplanes. All this required new machines and tools.

New Factories and Shipyards. It was also necessary to build many new factories and shipyards. So far as possible, these were built near the sources of raw products, in order to save transportation. Factories were built at separated points to lessen the danger from possible German and Japanese bombing raids.

Subcontracting. The extreme haste of war production, and the difficulty of obtaining raw materials made many small factories close their doors. The large corporations were better equipped to accept large contracts. Later, the practice of subcontracting developed. A large firm which had a contract for building tanks, guns, or airplanes made subcontracts with smaller firms for various necessary parts. Small businesses were told how to get subcontracts for those parts which small shops could make. In June, 1942, Congress authorized the establishment of a Smaller War Plants Corporation within the WPB. This agency helped small business concerns finance the construction, expansion, or conversion of their plants. Bank loans, guaranteed by the Government, were made to such companies.

The Housing Problem. The rapid building of new factories and the expansion of old plants required large numbers of new workers. The rush of workers and their families into war production centers caused housing shortages in many areas. To help solve this problem, trailers, prefabricated wooden dwellings, and even ce-

ment "balloon" houses were built. In 1941 Congress gave the Federal Housing Administration authority to insure mortgages up to 90 per cent of the appraised value of dwellings in critical defense areas. This was done in order to encourage the construction of houses for defense workers.

Mobilizing Man Power

Total war required the mobilization of men and women both for the armed services and for the vast industrial army that supplied the fighting forces with food, weapons, and equipment of war.

The Selective Training and Service Act. In passing the Selective Training and Service Act of September 16, 1940, Congress followed three principles. First, military service should be compulsory for all able-bodied men except conscientious objectors, who should be given noncombatant duties. Second, certain skilled workers should be deferred from military service because of the nature of their work. Third, men in the armed forces should get their jobs back at the end of their service. See SELECTIVE SERVICE.

Women in the War

Women in Uniform. Total war meant that man power included "woman power." For the first time in American history, women joined the army, the navy, the marine corps, and the coast guard.

The Women's Army Auxiliary Corps (WAAC) was started in May, 1942. In July, 1943, the name was changed to Women's Army Corps (WAC), and the service became a regular part of the army.

Women Appointed for Volunteer Emergency Service (WAVES). Members of this Women's Naval Reserve were trained for shore duty within the United States.

Women's Auxiliary Ferrying Command (WAFS) was established in September, 1942. WAFS served under the Air Transport Command of the Army Air Forces, which had the task of ferrying airplanes from factories to military bases. The name of this group was later changed to Women's Air Force Service Pilots (WASP).

Women's Reserve of the Coast Guard Reserve (SPARS) was created in November, 1942, to serve the Coast Guard much as the WAVES served the Navy.

Marine Corps Women's Reserve. In 1943, the Marine Corps began taking enlistments of women to relieve men at marine posts in the United States.

Women in Factories. As men entered the military services, many women began to take their places in the factories. By 1943 more than two million women were working in war industries. Most of them were drawn from the thirteen million women who had no children under sixteen. It was found that women could perform the duties of 80 per cent of the positions in twenty-one key war industries.

Civilian Life in Wartime

Total war changed the daily life of civilians in countless ways. Every home was touched by the war. To some persons, the war meant a better life than they had ever known. Industries could sell all they could produce, and were eager to hire workers. Wages went up no faster than prices, but many who had never held a well-paying job could now get one.

Shortages. It soon began to seem that there was not enough civilian goods to go around. In part, this was

because supplies of some goods were really lower than before the war. In part, it was because persons who had never been able to buy much now had a chance to live decently. This left some persons with much less than they generally had.

Rationing and Price Controls. There were real shortages of automobiles, refrigerators, radios, stoves, and hardware. Coffee and sugar supplies dropped for want of shipping, and rubber became very scarce indeed.

Automobile tires were the first commodity to be rationed. In May, 1942, sugar was added to the list of rationed items, and every person in the country got a "ration book." Coffee was rationed from November, 1942, to July, 1943. After February 1, 1943, almost all canned fruits, vegetables, juices, and soups were rationed. Meat rationing began a month later, and the rationing of butter, fats and oils, cheese, and canned fish was started at the same time. Gasoline was rationed in all parts of the country. On the east coast there was a real shortage at times, but the chief reason for the program was to save precious tires.

Price Controls. In January, 1942, Congress passed an Emergency Price Control Act. But it was hard to control prices without controlling wages. Early price rises had led to demands for higher wages, which in turn led to still higher prices. In October, 1942, Congress passed an Anti-Inflation Law allowing the President to hold wages, salaries, and prices at the level of September 15, 1942. On July 1, 1943, rents were "frozen" at that level.

The Products of the War

World War II was the mightiest struggle in which mankind had ever taken part. So it was natural that it should bring about revolutionary changes and upheavals in governments, economic conditions, and day-to-day living in all parts of the world. The causes of the war lay in many different unsolved problems. The war solved some of these problems, but it created many more than it solved.

War Costs

It is extremely difficult to measure the costs of anything so huge as World War II. No assessor can count the individual cost of the personal property lost in bombings and shellings. No person can measure the cost in human suffering and loss of life. There are no records available of many of the people slain. Only a rough estimate of the damage done can be given.

Casualties. The Vatican on November 21, 1945, placed the number of war dead, civilian and military personnel, at 22,060,000. This can be only a rough total. The figures on Chinese casualties, for instance, are very inaccurate, and there is no way to tell how many persons died of disease and starvation because of the war. Fewer died of disease than had in previous wars, but many died of starvation. The Vatican report estimated the number of wounded as 34,400,000.

Costs in Money. A survey under the direction of the American University placed the cost of the war for the world at \$1,154,000,000,000, and the cost of property damage at more than \$239,000,000,000. This survey estimated American expenditures for war material at

This meant that landlords could no longer raise rents.

Rationing was dropped on everything but sugar soon after the fighting stopped in 1945. Price controls were taken off all but a few items in 1946. Prices soared, and many persons learned for the first time why controls had been necessary during the war. See TRUMAN, HARRY S. (Administration as President).

Civilian Defense. Plans for protecting civilian life and property in case of air raids were developed. Public instruction on air-raid defense was given, and an air-raid warden service was established. Practice blackouts were carried out in many cities and districts. In the coast cities, "dim-outs" were enforced to cut down the glare that made ships at sea easier targets for U-boat attacks.

The expected air raids never came. Only a few fire-bombs, carried from Japan by balloons, fell near the west coast of the United States.

Censorship. In time of war, complete freedom in publishing the news may give helpful information to the enemy. Immediately after Pearl Harbor, censorship of communications was begun. The Office of Censorship was given power to censor all communications by mail, cable, radio, or other means of transmission passing between the United States and any foreign country or any vessel.

Codes of Wartime Practices were set up for the guidance of press and radio. But control of communications was limited chiefly to overseas mail. All other censorship was voluntary.

\$317,600,000,000; those of the Soviet Union at \$192,000,000,000; and those of the United Kingdom at \$120,000,000,000. It estimated that Germany spent \$272,900,000,000; Italy, \$94,000,000,000; and Japan, \$56,000,000,000.

Property damage can be estimated only on the basis of early studies, and may never be entirely known. Many treasures of art and architecture were lost. In addition, the war will continue to cost the countries which took part many billions of dollars for years to come. It has been estimated that the United States may spend as much as \$20,000,000,000 in caring for veterans of World War II.

Property damage was heaviest in the Soviet Union, Germany, the Balkan countries, China, and Japan. It was fairly heavy in England, France, Belgium, The Netherlands, and Italy.

Effects on Populations. Both actual fighting and the deliberate acts of the Germans greatly reshaped the form of Europe's populations. More than 5,000,000 Jews were killed by the Nazis. Most of the rest did not want to return to their former homes after the war, but preferred to move to Palestine or American countries.

The Germans moved Poles into central Poland, and removed Germans from the Baltic states. After the war, all Germans were moved to Germany, and Poles were settled in western Poland and eastern Germany. Nearly 10,000,000 persons were found to have been moved from their homes by the time the war ended.

Destruction of farms led to a great lowering of European food production. Europe came close to starvation

after the war. Only the efforts of the United Nations Relief and Rehabilitation Administration saved Europe from complete disaster.

International Relations

The events which led up to World War II forced the nations of the world to join one of the two sides — the Axis or the Allies. The alignment of countries took almost fifteen years to develop fully and was not always clear-cut. In some countries the people generally sympathized with one side, while their government remained strictly neutral or even tended to aid the other side.

Both events and men shaped the new design of international relationships. Germany's attack on the Soviet Union in the long run made the Soviets the dominating power in eastern Europe. The Soviet occupation of the Balkan states gave the Soviets much greater control in this area than they had had before the war. The development of long-range weapons robbed the United States of the protection that its two-ocean frontiers had once given it. In the same way, the development of air power made the protection of the British Empire by the British Navy out of date.

A new kind of diplomacy developed during World War II. This was the personal diplomacy of discussion between the top leaders of the main countries. Hitler began these conferences with his talks with Mussolini. In the Munich crisis, Chamberlain came to see Hitler. Later, Winston Churchill often visited Washington, D.C., to confer with President Franklin D. Roosevelt. These two leaders met with Chiang Kai-shek at Cairo, and with Joseph Stalin at Tehran and Yalta. Truman, Churchill and his successor, Clement Attlee, and Stalin met at Potsdam. These personal meetings made both for better planning of the war and for quicker understanding of the problems of the peace.

The shape of the postwar world grew out of these conferences. Postwar aims had their beginning in the Atlantic Charter drawn up by Roosevelt and Churchill on August 14, 1941. The Atlantic Charter read as follows:

The President of the United States of America and the Prime Minister, Mr. Churchill, representing His Majesty's Government in the United Kingdom, being met together, deem it right to make known certain common principles in the national policies of their respective countries on which they base their hopes for a better future for the world.

(1) Their countries seek no aggrandizement, territorial or other.

(2) They desire to see no territorial changes that do not accord with the freely expressed wishes of the peoples concerned.

(3) They respect the right of all peoples to choose the form of government under which they will live; and they wish to see sovereign rights and self-government restored to those who have been forcibly deprived of them.

(4) They will endeavor, with due respect for their existing obligations, to further the enjoyment by all States, great or small, victor or vanquished, of access, on equal terms, to the trade and to the raw materials of the world which are needed for their economic prosperity.

(5) They desire to bring about the fullest collaboration between all nations in the economic field with the object of securing, for all, improved labor standards,

economic advancement and social security.

(6) After the final destruction of the Nazi tyranny, they hope to see established a peace which will afford to all nations the means of dwelling in safety within their own boundaries, and which will afford assurance that all the men in all the lands may live out their lives in freedom from fear and want.

(7) Such a peace should enable all men to traverse the high seas and oceans without hindrance.

(8) They believe that all of the nations of the world, for realistic as well as spiritual reasons, must come to the abandonment of the use of force. Since no future peace can be maintained if land, sea, or air armaments continue to be employed by nations which threaten, or may threaten, aggression outside of their frontiers, they believe, pending the establishment of a wide and permanent system of general security, that the disarmament of such nations is essential. They will likewise aid and encourage all other practicable measures which will lighten for peace-loving peoples the crushing burden of armaments.

Following the drawing up of the Atlantic Charter, the United Nations was born in further discussions between leaders of the Allied nations. The decision to hold the organizing conference at San Francisco in April, 1945, was made at the Yalta Conference. At San Francisco the first beginnings were made toward a world organization which would make war impossible.

The Individual Countries

The growth of internationalism was a slow one which all people realized would probably take many years. Meanwhile, the countries of the world tried to restore themselves to stability and prosperity. The war left much confusion.

Europe. Only four major countries of Europe managed to escape being involved in the war. These were Sweden, Portugal, Switzerland, and Eire. Spain did not declare war, but it openly favored the Axis. Sweden gave Germany supplies but secretly aided the Allies in many ways. Francisco Franco's Spain furnished some troops to fight against the Soviet Union at the same time it received oil and other supplies from the Allies.

Portugal remained neutral but gave the Allies air bases in the Azores. Each side found Portugal's neutral position useful in maintaining secret agent work. Eire refused British demands for bases on its southern coast, but many Irish joined the British armed forces. Switzerland served as the main agency for relief work.

Southeastern Europe. All the Balkans came under German control either through invasion or bloodless surrender. But later the Red Army conquered these countries. The Soviet Union put much pressure on them to form governments sympathetic with the Soviet Union and did not allow the other Allies to extend their influence there. Marshal Tito's Yugoslav government was openly communistic. Communist-controlled governments also came to power in Bulgaria and Rumania. Communists had less success in Hungary. Greece found itself a battleground between conflicting Soviet and British aims. British troops drove out Communist-led forces from southern Greece, but these forces made many inroads into northern Greece. The Greek government, however, tended to favor Britain.

Italy went through a period of governmental difficulties. The monarchy was overthrown, but democratic

elements had difficulty in co-operating. Communists tried to upset the Christian Democratic Government.

Central Europe. Austria set up a Socialist government after it gained its independence. But the disruption of its economy made recovery very slow, and no great political movements developed for many months after the war. Czechoslovakia and Poland came under the domination of the Soviet Union.

France built a new government based on a new constitution. De Gaulle retired from the government but led a strong conservative faction. The Communists gained greatly in power. There was much unrest in French colonies.

The Lowlands. Luxemburg and The Netherlands returned their prewar governments to power. Belgium refused to take Leopold back as king. All the Lowlands were more successful in restoring prosperity than the rest of Europe.

Scandinavia. Denmark returned quickly to prosperity because of its large-scale food production. The monarchy remained in power. In Norway, King Haakon VII was joyfully received once again. Finland turned against its wartime pro-German Government and tried Baron Mannerheim for treason.

The British Empire. The United Kingdom had to keep most of its wartime economic controls in an attempt to regain its prewar prosperity. Most consumer goods were rationed strictly to allow goods to be exported. The British suffered greatly because of the loss of much of their merchant fleet. At the first national election after the War, the Labor party was given an overwhelming support of its state socialism program.

The Dominions loyally supported Britain throughout the war, but they made no move to strengthen their ties with Britain. In August, 1947, India won its long-sought independence as the separate dominions of India and Pakistan. Burma became an independent republic in January, 1948.

The Americas. The United States dominated the democratic group of nations and stiffened its attitude against the Soviet Union.

The Americas became firmly united during the war. All the countries on both continents declared war on the Axis, although only Brazil and Mexico actually furnished fighting forces. The Act of Chapultepec allied the Americas militarily, and many moves were made to unify and improve the defenses of the Western Hemisphere.

Middle East. The peoples of the Middle East worked after the war to remove themselves from European control. The Arab nations grew in strength. Syria and Lebanon successfully demanded the withdrawal of French troops. Palestine continued to have difficulty with the Jewish immigration problem.

Asia. The victory in the Pacific led to new troubles in Asia. The people of the various colonies did not welcome the return of their prewar European governors. In the rebellious Netherlands Indies, the Dutch were finally forced to agree to a program looking toward independence for the colony. French Indo-China also made demands for independence which were partly granted. Hindu-Moslem riots followed the partition of India into the free dominions of India and Pakistan.

The Philippines received their independence on July 4, 1946. China found its peace short-lived. The defeat of the Japanese only allowed the long struggle between the Nationalist and Communist forces to get a new start.

The Making of the Peace

The making of the formal peace treaties to end the war took many months of conferences. At the Potsdam Conference, the leaders of the United States, Great Britain, and the Soviet Union agreed that the foreign ministers of the Big Five (the three countries plus China and France) would meet frequently to draw up treaties. These treaties would be submitted to the United Nations for their approval.

The first meeting took place in London in the fall of 1945. It was most unsuccessful. The unity which the major powers had shown in waging the war was absent in making the peace. The chief differences were between the Soviet Union and the United States and Britain.

But at later meetings, compromises were slowly worked out. Delegates from all the United Nations met in Paris from August to October, 1946, to discuss the peace treaties with Italy, Bulgaria, Hungary, Rumania, and Finland. The treaties were drawn up in a meeting of the Council of Foreign Ministers in New York City during November and December, 1946. They were signed in Paris on February 10, 1947. The terms of the treaties were as follows:

Italy was required to pay a total of \$360,000,000 in reparations over a period of seven years. It lost all its African colonies. Great Britain was to hold control of them until the United Nations decided on their disposal. Italy recognized the independence of Albania and Ethiopia. The former Italian city of Trieste was made a free territory. Italy lost small border areas to France and Yugoslavia, and the Dodecanese Islands were ceded to Greece. The Italian Army was set at 185,000 men, with an additional force of 65,000 *carabinieri*, or police. Its armored force was limited to 200 tanks, and no long-range weapons were permitted. The Italian Navy was allowed two battleships plus 67,000 tons of other ships. Naval forces were limited to 25,000 men, not including naval air personnel. Italy's air force was limited to 25,000 men, with 200 fighter and reconnaissance planes, plus 150 noncombatant planes. No bombers were permitted.

Bulgaria was required to pay \$45,000,000 in reparations to Greece, and \$25,000,000 to Yugoslavia. It kept the territory it had had on January 1, 1941. The Bulgarian Army was limited to 55,000 men, with anti-aircraft artillery units having a strength of 1,800 men. The navy was limited to 7,250 tons and 3,500 men. The Bulgarian air force was set at 90 planes, including 70 combat planes, and was limited to 5,200 men.

Rumania was required to pay \$300,000,000 in reparations, all to the Soviet Union. It confirmed the cession of Bessarabia to the Soviet Union but regained Transylvania from Hungary. Its army was limited to 120,000 men, its navy to 15,000 tons and 5,000 personnel, and its air force to 150 planes, with not more than 100 combat planes, and 8,000 personnel. Rumania was allowed anti-aircraft units with a total strength of 5,000 men.

Hungary was required to pay \$300,000,000 in reparations, with \$200,000,000 going to the Soviet Union and the rest to Czechoslovakia and Yugoslavia. Hungary kept its prewar boundaries, ceding territory to Czechoslovakia and returning Transylvania to Rumania. Its army was limited to 65,000 men. Its air force was

WORLD WAR II

WORLD WAR II

IMPORTANT EVENTS OF WORLD WAR II

September 18, 1931	Japan invades Manchuria.	November 27	French fleet at Toulon scuttled.
October 3, 1935	Italy invades Ethiopia.		1943
March 7, 1936	German troops occupy Rhineland.	January 23	British capture Tripoli.
July 17, 1936	Spanish Civil War begins.	February 2	Battle for Stalingrad ended.
July 7, 1937	Japan invades China.	May 7	Allies capture Tunis and Bizerte.
March 11-13, 1938	Germany seizes Austria.	May 12	Axis forces in Africa surrender.
September 30, 1938	Munich Agreement signed.	July 10	Allies invade Sicily.
	1939	July 25	Fascist Grand Council ousts Mussolini.
March 15	Germany seizes Czechoslovakia.	September 3	Italy signs armistice agreement; Allies land in southern Italy.
March 21	Germany seizes Memel.	October 1	Allies capture Naples.
April 7	Italy seizes Albania.	October 13	Italy formally declares war on Germany.
August 23	Soviet-German pact signed.	November 6	Soviets recapture Kiev.
September 1	Germany invades Poland.	November 22	U.S. Marines land on Tarawa.
September 3	Great Britain and France declare war on Germany.		1944
September 28	German conquest of Poland completed.	January 20	Soviets lift siege of Leningrad.
November 30	Soviet Union invades Finland.	February 1	U.S. troops land on Kwajalein.
	1940	February 20	U.S. troops capture Eniwetok.
March 12	Finland signs peace treaty with Soviet Union.	February 29	U.S. troops land in Admiralty Islands.
April 9	Germany invades Denmark and Norway.	March 20	Germans occupy Hungary.
May 10	Germany invades The Netherlands, Belgium, and Luxembourg.	April 22	U.S. troops land at Hollandia.
May 14	Germans complete conquest of The Netherlands.	June 4	Allies capture Rome.
May 28	Belgium surrenders to Germany.	June 6	Allies land in Normandy.
June 9	Allies, Norwegian king and government withdraw from Norway.	June 15	U.S. troops land on Saipan; first B-29 raids on Japan; first robot bombs land in England.
June 10	Italy declares war.	June 18-19	Battle of the Philippine Sea.
June 14	Germans occupy Paris.	July 21	U.S. troops land on Guam.
June 22	France signs armistice at Compiègne.	July 26	Allied break-through in Normandy.
June 27	Rumania cedes Bessarabia to Soviet Union.	August 15	Allies land in southern France.
July 14	Soviet Union annexes Baltic states.	August 18	Soviet troops invade eastern Germany.
August 7	Italy invades British Somaliland.	August 23	Rumania signs armistice with Allies.
October 11	German troops move into Rumania.	August 25	Paris liberated.
October 28	Italy invades Greece.	September 4	Finland signs armistice with Soviet Union.
	1941	September 9	Bulgaria surrenders to Allies.
January 21	British invade Eritrea, Ethiopia, and Italian Somaliland.	September 11	Allied troops invade western Germany.
March 11	Lend-Lease Act becomes law.	September 15	U.S. troops land on Peleliu and Morotai.
April 6	Germany invades Yugoslavia and Greece.	October 19-20	U.S. troops land on Leyte.
June 8	British and Free French enter Syria.	October 23-25	Battle for Leyte Gulf.
June 22	Germany invades Soviet Union.	December 16	Germans begin Battle of the Bulge.
August 14	Atlantic Charter announced.	December 28	German drive stopped.
December 7	Japanese attack Pearl Harbor.		1945
December 23	Wake Island surrenders to Japanese.	January 9	U.S. troops land on Luzon.
December 25	Hong Kong surrenders to Japanese.	January 17	Soviet troops capture Warsaw.
	1942	January 21	Hungary declares war on Germany.
January 2	Manila falls.	February 13	Soviets capture Budapest.
January 23-28	Battle of Macassar Strait.	February 19	U.S. troops land on Iwo Jima.
January 31	U.S. fleet attacks Marshall and Gilbert Islands.	February 23	Allied troops open widespread attack on Western Front.
February 15	Singapore falls to Japanese.	March 6	Allies capture Cologne.
March 7	Dutch surrender Netherlands Indies.	March 8	American troops first cross Rhine.
April 9	Japanese take Bataan.	April 1	U.S. troops land on Okinawa.
April 18	American planes bomb Japan.	April 13	Soviets capture Vienna.
May 6	Corregidor falls to Japanese.	April 16	Allies begin all-out offensive in Italy.
May 4-9	Battle of the Coral Sea.	April 22	Soviet troops enter Berlin.
June 3-5	Battle of Midway.	April 27	Soviet and American troops join in Europe.
July 1	German drive stopped at El Alamein.	April 29	Germans surrender in Italy.
August 7	U.S. Marines land on Guadalcanal.	May 2	Berlin surrendered.
September 16	Germans enter Stalingrad.	May 7	Germany surrenders unconditionally.
October 23	British begin offensive at El Alamein.	July 26	Potsdam Declaration issued.
November 7-8	Allies land in North Africa.	August 6	First atomic bomb dropped on Hiroshima.
November 11	French cease resistance in North Africa.	August 8	Soviet Union declares war on Japan.
	Germans occupy all France.	August 9	Atomic bomb dropped on Nagasaki.
		August 10	Japan opens peace negotiations.
		August 15	Japan accepts terms of Potsdam Declaration.
November 13-15	Battle of Savo Island.	September 2	Japan signs surrender.



How Treaties Changed Map of Europe

limited to 90 planes, including 70 combat planes, and 5,000 personnel.

Finland's treaty with the Soviet Union and Great Britain (Finland was not at war with the United States) provided for \$300,000,000 in reparations to the Soviet Union as well as the loss of the port and province of Petsamo to the Soviet Union. Its army was limited to 34,400 men, its navy to 10,000 tons and 4,500 personnel, and its air force to 60 planes and 3,000 personnel. Finland granted the Soviet Union a fifty-year lease for the establishment of a naval base at Parkkala-Udd.

All the treaties limited border fortifications and forbade the use of motor torpedo boats. The treaties provided for the withdrawal of occupation forces from Italy and Bulgaria within ninety days after the signing of the treaties. Soviet forces were allowed to stay in Rumania and Hungary to maintain communications with Austria. The treaties provided in principle for free right of all nations to navigate on the Danube.

All five treaties made guarantees against discrimination against races and religions and forbade the forma-

tion of Fascist parties. All treaties required the countries to repay citizens of the United Nations two thirds of the cost of property lost in the countries as a result of the war. Each country had to grant equal trade rights to all countries. Each was forbidden to possess, construct, or experiment with atomic weapons or guided or self-propelled missiles.

The basic methods for dealing with Germany were decided at the Potsdam Conference in July, 1945. It was decided to undertake a program of removing former Nazis from public positions and to educate the German people for democracy. It was also decided to establish a unified economic system for Germany, which would make Germany a self-supporting country but would deny it any industries which would allow it to rebuild its war machine. The Soviet Union was allowed to remove for reparations all machinery in its zone which was not necessary for the German peacetime economy, and was promised 25 per cent of such equipment from the French, British, and American zones. The Soviet Union was required to give Poland reparations from the total of its own reparations. The Potsdam Agreement also tentatively transferred a section of East Prussia to the Soviet Union, and the rest of German lands east of the Oder to Poland, according to the agreement made at the Yalta Conference.

Disagreements between the United States and the Soviet Union delayed the writing of peace treaties for Germany, Austria and Japan. They also hindered the carrying out of plans made at the Potsdam Conference.

S.B.F.

Related Subjects. Specific information about the share each country had in World War II will be found in the article on that country. See, for example, CANADA (in World War II). The reader is also referred to:

BATTLES

Aleutian Islands	Luzon
Ardennes Mountains and Forest	Manila
Athens (The Modern City)	Manila Bay
Bataan Peninsula	Marshall Islands
Battles, Fifteen Decisive	Midway Island
Caroline Islands	New Guinea
Chinese-Japanese Wars	Okinawa
Corregidor	Pearl Harbor
Dunkerque	Qattara Depression
Guam	Russo-Finnish War
Iwo Jima	Saipan
Leyte	Solomon Islands
Lidice	Wake Island

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Arnold, Henry H.	Crerar, Henry D. G.
Attlee, Clement R.	Cunningham, Andrew B., Sir
Badoglio, Pietro	Daladier, Edouard
Beneš, Eduard	Darlan, Jean L. X. F.
Blamey, Thomas A., Sir	De Gaulle, Charles A. J. M.
Boris III	Doenitz, Karl
Bradley, Omar N.	Dollfuss, Engelbert
Brauchitsch, H.A.H.W. von	Doolittle, James H.
Brereton, Lewis H.	Eden, Anthony
Brooke, Alan F., Sir	Eisenhower, Dwight D.
Buckner, Simon Bolivar, Jr.	Fraser, Bruce A., Sir
Chamberlain (Neville)	Ghormley, Robert L.
Chennault, Claire	Giraud, Henri H.
Chiang Kai-shek	Goebbels, Joseph P.
Churchill, Winston	Goering, Hermann P.
Clark, Mark W.	Gort, John S.P.V., Viscount

Graziani, Rodolfo
 Halsey, William F., Jr.
 Heydrich, Reinhard
 Himmler, Heinrich
 Hirohito
 Hitler, Adolf
 Hodges, Courtney H.
 Hull, Cordell
 Jodl, Alfred
 Kaiser, Henry J.
 Keitel, Wilhelm
 Kesselring, Albert
 King, Ernest J.
 Kinkaid, Thomas C.
 Kluge, Gunther von
 Konev, Ivan S.
 Konoye, Fumimaro, Prince
 Krueger, Walter
 Krupp
 Kurusu, Saburo
 Laval, Pierre
 Leahy, William Daniel
 Le May, Curtis E.
 Leopold (III, Belgium)
 MacArthur, Douglas
 McNair, Lesley J.
 McNaughton, Andrew G. L.
 Malinovsky, Rodion Y.
 Marshall, George C.
 Mauldin, "Bill," William H.
 Mihailovich, Draža
 Mitscher, Marc A.
 Molotov, Vyacheslav M.
 Montgomery, Bernard L.
 Mountbatten, Louis,
 Viscount
 Mussolini, Benito

CONFERENCES AND TREATIES

Capablanca
 Casablanca Conference
 Locarno Conference
 Munich Agreement

FORCES, MATERIALS, AND WEAPONS

Air Force
 Airplane (with list)
 Ammunition
 Amphibious Warfare
 Army (with list)
 Atomic Bomb
 Bazooka
 Blitzkrieg
 Bomb
 Bulldozer
 Camouflage
 Chemical Warfare
 Coast Guard
 Commando
 Convoy
 Escort Carrier
 Fifth Column
 Intelligence Service
 Jeep
 Jet Propulsion
 Landing Craft
 Lend-Lease

ORGANIZATIONS

American Legion
 American Legion Auxiliary
 Gold Star Mothers,
 American
 Red Cross

SUPPLY ROUTES

Alaska Highway
 Burma Road

Nelson, Donald M.
 Nimitz, Chester W.
 Patch, Alexander M.
 Patton, George S., Jr.
 Pétain, Henri P.
 Pound, Dudley, Sir
 Pyle, "Ernie," E. T.
 Quisling, Vidkun
 Ramsay, Bertram H., Sir
 Rankin, Jeannette
 Ribbentrop, Joachim von
 Rommel, Erwin
 Roosevelt, Franklin D.
 Rosenberg, Alfred
 Rundstedt, Karl R. G. von
 Schuschnigg, Kurt von
 Spaatz, Carl
 Spruance, Raymond A.
 Stalin, Joseph
 Stark, Harold R.
 Stilwell, Joseph W.
 Stimson, Henry L.
 Timoshenko, Semën K.
 Tojo, Hideki
 Tolbukhin, Fedor I.
 Truman, Harry S.
 Turner, Richmond K.
 Vandegrift, Alexander A.
 Vatutin, Nikolai
 Voroshilov, Kliment E.
 Wainwright, Jonathan M.
 Wavell, Archibald P.,
 Viscount
 Weyand, Maxime
 Yamamoto, Isoroku
 Zhukov, Grigori K.

UNCLASSIFIED

Alien
 Atabrine
 Azores
 Conscientious Objector
 D Day
 Neutrality
 Nürnberg Trials
 Polish Corridor

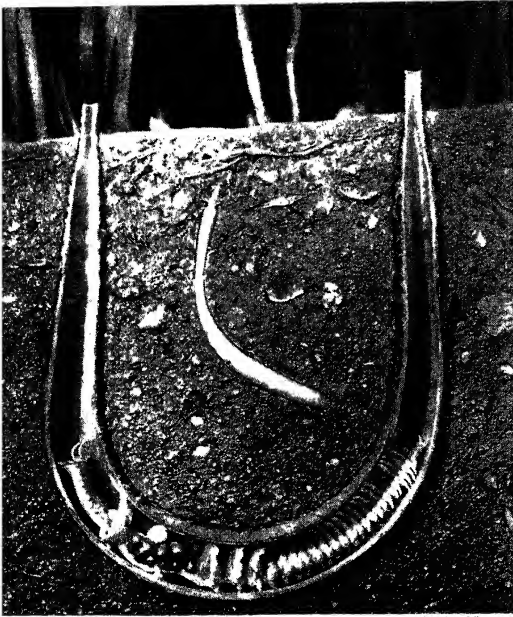
Stars and Stripes
 V-E Day
 V-J Day
 War Debt
 War Risk Insurance
 World War I
 Yank

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Questions

How and where did Hitler make his first conquest?
 Why was the Munich agreement important in the history of World War II? What were its results?
 What was the *blitzkrieg*? When and where did the Nazis first use it?
 How was the battle against the German submarines finally won?
 What is meant by "underground movements" of the war? Who were the fifth columnists?
 What was the "Battle of the Bulge"? What events resulted in "Stilwell's March"? What was the "island hopping" plan of the Allies? How did the Allies get control of Iwo Jima? Of Okinawa? Why were these islands important? What was the purpose of the Potsdam Declaration? When and where was the first atomic bomb used in warfare? The second bomb? Where and when did the Japanese surrender?



American Museum of Natural History

The Parchment Worm Lives in a Tube. The tube, or burrow, shown in cross section, is buried in the mud. By flapping parts of its body, the worm creates a current of water which brings food and oxygen into the tube.

WORM. Worms, in a popular sense, include a wide variety of crawling animals with soft bodies. To zoologists the true worms are different from wormlike larvae. Larvae are the young of beetles, butterflies, and other insects.

True worms are animals with many cells. But they have neither a backbone nor the supporting rod called the *notochord*. Some worms have a body cavity that holds their internal organs. Others, such as flukes and tapeworms, have their internal organs imbedded in a sort of loose packing tissue. They do not have a creeping foot like snails, or jointed legs like insects.

Worms range in size from microscopic forms to some of the tapeworms, which may grow thirty feet long. The nematodes, or eelworms, are among the most numerous kinds of worms. Some of these are almost microscopic creatures that live by the millions in water, soil, and decaying material from plants and animals. Many worms are important parasites of man and animals. The parasitic forms include flukes, tapeworms, pinworms, hookworms, trichina, ascaris, and filariae. Such worms cause many important human diseases.

Zoologists have had trouble defining worms and classifying them. Linnaeus divided all invertebrate animals into two classes, *Insecta* (insects) and *Vermes* (worms). *Vermes* took in wormlike creatures and many other lower forms. In later classifications, the group *Vermes* took in fewer and fewer forms.

Most worms belong to one of three large groups, or phyla. These are the flatworms, or *Platyhelminthes*, the roundworms, or *Nemathelminthes*, and the segmented worms, or *Annelida*. The annelida are the most highly developed worms. They include the leeches and earthworms. There are several thousand known species of worms.

A.C.Chr.

WORMWOOD

Related Subjects. The reader is also referred to:
 Earthworm Hairworm Ribbon Worm
 Eelworm Hookworm Roundworm
 Filaria Leech Tapeworm
 Flatworm Lobworm Trichina
 Fluke Pinworm

WORM GEAR. See GEAR; SCREW.

WORMS. See GERMANY (Cities).

WORMS, DIET OF. See LUTHER, MARTIN.

WORMS, EDICT OF. This was the sentence pronounced upon Martin Luther by the Diet of Worms in 1521. The Edict proclaimed Luther a heretic and cast him outside the protection of the law.

WORMSEED. See LAMB'S-QUARTERS.

WORM WHEEL. See SCREW.

WORMWOOD. A great many plants that give off pleasing odors and belong to the thistle family are called wormwood. Often the term wormwood is used as the name of an entire group of about 250 different kinds of plants of the genus *Artemisia*. The most important wormwood in commercial use is a perennial plant that grows in Europe and North Africa. This kind of wormwood supplies an essential oil which is used in the manufacture of absinthe and also in medicine. Common wormwood, or *mugwort*, is grown in Europe for seasoning and for medicinal purposes. In eastern Canada and the northeastern United States, this plant is considered a weed. In the western United States several kinds of shrubby wormwoods are known as sagebrush. H.N.M.

Classification. The genus *Artemisia* belongs to the *Compositae* (part of the so-called *Compositae*). The wormwood yielding oil for absinthe is *A. absinthium*. Common wormwood is *A. vulgaris*. The common sagebrush of the western



J. Horace McFarland

Leaves of the Wormwood Yield a Valuable Oil

plains is *A. tridentata*. Roman wormwood is a name often given to *Corydalis sempervirens* (family *Fumariaceae*) and *Ambrosia elatior* (family *Ambrosiaceae*). The wormwood mentioned in several places in the Bible is *Artemisia judaica* and possibly *A. arborescens*. These plants are probably also the "hemlock" mentioned in the books of Amos and Hosea in the Bible.

WORSHIP. See COLONIAL LIFE IN AMERICA (Why the Colonists Came); FREEDOM OF RELIGION; GOD; IDOL; PRAYER.

WORSTED, WOOS *ted*, is a smooth, shiny, strong wool yarn. It gets its name from Worstead, England, where it was first made. The yarn is spun from long wool yarns which have been combed to lay the fibers straight. *Worsted* also means cloth that has been woven with worsted yarns. Such cloths have a smooth, hard look. Poplin and serge are worsted cloths. G.G.D.E.

WORT, *wurt*. See BREWING.

WORTH, WILLIAM JENKINS (1794-1849). See FORT WORTH.

WOTAN, WO *tan*. See ODIN.

WOUND, *woond*. Wounds are breaks in the skin or flesh caused by an injury. Wounds that heal quickly without the formation of pus are said to heal by *first intention*. Most wounds made in modern surgery heal in this way because the cutting instruments are completely sterile, or free from germs, and operating rooms are disinfected. Accidental cuts, bruises, and abrasions, caused by sharp or blunt instruments, glass, wheels of vehicles, and other objects, often become infected because the surfaces of these objects usually have germs on them. When a wound does become infected, it is said to heal by *secondary intention*. Healing is aided when small pebbly masses of flesh called *granulations* form in the wound.

Types of Wounds. *Abrasions* are caused by scuffing or scraping off the skin. Children at play on concrete walks often fall and scrape skin from their knees. Such abrasions may easily become infected because a wide surface is exposed to germs. Thousands of germs may enter the very smallest wound. *Incisions* are made by sharp instruments such as a knife or piece of broken glass. They usually bleed freely, and the flowing blood helps to cleanse the wound. *Punctures* are caused by bullets, nails, sharp wire, or other such instruments. Unless a blood vessel is injured, punctures do not usually bleed freely, and easily become infected. *Lacerations* are torn places in the flesh. They are caused by blunt instruments or by falls. Bleeding usually is not severe, but there is danger of infection because dirt may be ground into the tissues. *Burns* are another type of wound.

First Aid to the Wounded. A serious wound requires the attention of a doctor. Before he arrives, the wound must be kept from contact with germs. If the wound is on a part of the body covered with clothing, rip or cut the garment and turn back the cloth. Exposure to the air is less likely to infect the wound than contact with clothing. Bleeding helps the wound to clean itself by washing away any germs present. But serious bleeding should be checked by pressure to avoid excess loss of blood.

Lessons from the Wars. Each new war creates new problems with respect to wounds, but science has always met these problems with new answers. Improved meth-

ods during World War I included the routine treatment of all wounded soldiers with serum to prevent lockjaw, or tetanus, and the washing of wounds with Dakin's solution. Serious wounds suffered during the Spanish civil war of the 1930's were trimmed of all dead tissue and sealed raw in plaster casts. During World War II this method was also used. Sulfa drugs were widely used, and strong antiseptics were not so popular as they had been before. Many lives were saved by blood transfusion and injection of plasma, or dried blood. W.R.L.A.P.

See also FIRST AID; GRANULATION.

WOUNDED KNEE, BATTLE OF. See SOUTH DAKOTA (Territorial Days).

WPA. See ADULT EDUCATION; NEW DEAL (Leading New Deal Agencies); ROOSEVELT, FRANKLIN DELANO (Administrations as President [Unemployment]).

WRANGEL, RANG *gel*, **ISLAND** lies in the Arctic Ocean, about ninety miles north of the northeastern corner of Siberia. It covers an area of 1,806 square miles, and has a population of about 50. The island is a dreary stretch of cold, barren, granite rocks locked in most of the year by solid ice packs. The Soviet Government now claims the island, but its ownership has often been disputed.

Wrangel Island was named for the Russian explorer Baron Ferdinand von Wrangel, who searched for it in 1823 after Siberian natives had reported its existence. But Wrangel never found the island. It was finally discovered by American whalers in 1867. The Americans gave the island its name. In 1881 two Americans, Lieutenant R. M. Berry and Captain Calvin L. Hooper, separately and at different times, explored the island. Hooper named it New Columbia, and claimed it for the United States.

Wrangel Island remained uninhabited until 1921. In that year the Canadian explorer Vilhjalmur Stefansson sent a private expedition of four men and an Eskimo woman to the island. All the men died, and the woman was taken from the island. In 1923 one white man and twelve Eskimo from Alaska occupied Wrangel Island. But they, too, soon left. The Soviet Government then established a colony of fifty settlers from a nomadic tribe of Siberia. W.E.E.

WRANGELL, MOUNT. See MOUNTAIN (Famous Mountains of the World).

WREN. Wrens are small and very active birds. They have slender bills, wings that are slightly curved and rounded, and dull brown or gray feathers. Their tails

are often held straight rather than out behind as in other birds. Many kinds of wrens live in the Americas, especially in places where the climate is mild, but only one species is found in Europe. Wrens like to live near the ground. They are always moving about and never seem to be at rest. They eat insects. For this reason they are very helpful to the farmer. Wrens can sing very beautifully, but they can also make disagreeable chattering sounds.

Food of the House Wren



The *house wren*, which is also known as the *common wren*, the *jenny wren*, and the *brown wren*, is the most familiar of all the wrens. It is about five inches long and is often seen in cities. It will nest in wren houses which are built especially for it. It lays five to seven eggs, which are white in color and thickly dotted with salmon spots. The wren is extremely valuable because it eats insects, particularly around gardens.

The largest wren in the United States is the *cactus wren*. It may be seven inches long. This wren lives in the dry regions of the Southwest. Its breast is heavily spotted. The *rock wren* lives in the western part of the United States. It builds its nest under rocks in the dry foothills of the Rocky Mountains. It is mostly gray in color, and about an inch shorter than the cactus wren. The *Carolina wren* lives in the southern United States. It often nests in farm buildings. The Carolina wren is about five and one-half inches long. *Bewick's wren* is about five inches long. It likes to live around people's homes. Its tail is edged with white, and it has a white line over its eyes. The *winter wren* is the tiniest of all the wrens. It is only about four inches long. It builds its nest in the wild forests of northern United States and Canada. It has a beautiful song. The *long-billed* and the *short-billed marsh wrens* build their nests among reeds and cattails in marshes. The long-billed marsh wren has a gurgling, liquid song. The song of the short-billed marsh wren sounds like striking two pebbles rapidly together. The long-billed is the more common of the two marsh wrens. Its tail is held up straight, or forward over its back. The short-billed marsh wren is only a little more than four inches long. A.A.A.

See also BIRD (Territories of Birds; color plates, Birds Seen in the City; State Birds).

Classification. The wren family is *Troglodytidae*. The cactus wren is *Heleodytes brunneicapillus*; the rock wren, *Salpinctes obsoletus*; the Carolina wren, *Thryothorus ludovicianus*; the winter wren, *Nannus hiemalis*; and the house wren, *Troglodytes aëdon*. The long-billed marsh wren is *Telmodytes palustris*; and the short-billed marsh wren is *Cistothorus stellaris*.

WREN, CHRISTOPHER, SIR (1632-1723), was perhaps the greatest of English architects. His work is noted for its simplicity and graceful lines. He was a practical man and concentrated on one special feature of the building for his artistic effects. His churches, for example, are known for their beautiful spires.

Wren, the son of a clergyman, was born in East Knoyle, Wiltshire. He was educated at Westminster and at Wadham College, Oxford University. As a student Wren won fame for his work in geometry, and in 1660 he was made Savilian Professor of Astronomy at Oxford. He became a noted scientist, and his house in London was a gathering place for the leading scientists of the day.

Wren began his career as an architect in 1663, and within a few years his work was well known. He was one of the architects commissioned to repair the old Saint Paul's Cathedral in London. But before Wren could begin work on it, the cathedral was hopelessly damaged in the great London fire of 1666. Wren was commissioned to rebuild Saint Paul's completely, and he worked at this task until 1710. He also rebuilt fifty-two

other churches which had been burned down in the fire.

Wren also made a detailed plan to rebuild the entire City (old central part) of London. This plan would have made London the most beautiful city in the world. But unfortunately Wren's plan threatened old property arrangements and was not carried out. In 1673 Wren was made a knight and a few years later became a member of Parliament. In 1681 he was elected president of the Royal Society. He was buried in Saint Paul's. K.J.C.

WRESTLING, RES ling, is one of the most healthful of sports. It brings every muscle into play, from the crown of the head to the soles of the feet. In wrestling, it is not always the strongest or heaviest man who wins. Weight is important, but skill counts more. The wrestler who has mastered all the difficult holds and escapes that may be used stands a very good chance of throwing a much heavier and stronger opponent who has less skill. A quick eye and decisive action are as important in this sport as in any other. The slow wrestler is usually the loser. He wastes his strength instead of concentrating it in a sharp attack and in unexpected strategy.

Wrestling is one of the very oldest of sports because it is a natural competitive sport. There are few feints or tricks known to the modern wrestler that were not practiced by Greek and Roman athletes before the birth of Christ. Some authorities say that wrestling was known as early as 3000 B.C. in Egypt and Babylonia. Early Greek legends tell of the wrestling achievements of Theseus, Ajax, Ulysses, and other heroes. Later, in recorded history, wrestling became one of the most important events in the first Olympian Games. It was the final test of athletic ability in the famous pentathlon at the Olympics.

The ancient popularity of wrestling has lasted down to the present day. During the Middle Ages the sport had followers among all classes. Later, many different styles of wrestling developed according to the locality or country. People in Europe, the Orient, and North America each made up their own set of rules.

In the United States, wrestling was at first only an amateur sport. Holiday celebrations often included wrestling matches between local champions. In the 1880's, professional wrestling began, and champions began laying claim to titles. The names of Tom Jenkins, Frank Gotch, Strangler Lewis, Farmer Burns, and Jim Londos stand out in American wrestling history. In the 1920's professional wrestling began to become more of a comic show than a sport with much excessive acting and faked holds for the benefit of the spectators. But the crowds must like this showmanship, for the professional sport has become a profitable business.

Amateur wrestling has had a more steady and dignified growth. The first college meet was held in 1900 between the University of Pennsylvania and Yale University. The first Eastern Intercollegiate meet was held in 1905. Wrestling has developed into a highly scientific game, with rules to bar dangerous or severely punishing holds. Point systems for scoring give credit for skillful execution or technical maneuvers. They have greatly speeded up the action. Various weights have been established to insure equality of competition. The intercollegiate weights are eight in number. They are 121 pounds and under, *flyweight*; 128, *bantamweight*;

THE ART OF WRESTLING



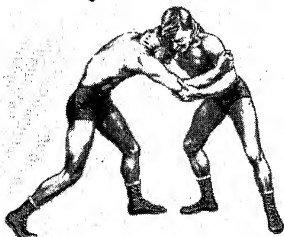
On-guard Position



Leg Dive



Arm Lock and Near Leg Hold



Referee's Hold



Side Chancery



Cross Buttock and Waist Hold



Bear Hug



Half Nelson



Full Nelson

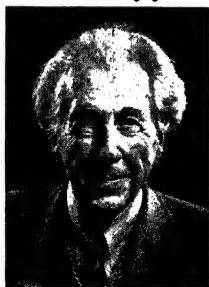
136, featherweight; 145, lightweight; 155, welterweight; 165, middleweight; 175, light heavyweight; and over 175, unlimited heavyweight.

Two styles of wrestling are scheduled in the modern Olympic Games. These are *Greco-Roman* and *catch-as-catch-can*. The emphasis in the *Greco-Roman* style is on *standing* holds. The contestants strip to the waist and are not permitted to seize each other anywhere below the belt or to trip each other. A *fall* is scored when one of the contestants forces the two shoulders of his opponent to the ground at the same time. Bulk and endurance count greatly in this style, which was really developed in France rather than in either Greece or Rome, as the name would suggest.

American wrestlers emphasize the *prone* holds after an opponent has been brought to the mat. This is the *catch-as-catch-can* style used by boys on the playground and in exhibition bouts. Its popularity is explained by the fact that it is a very free style and allows a great deal of liberty to the contestants. It encourages and rewards strategy, and permits every legitimate trick. Tripping is allowed as well as tackling, but kicking and choking holds are barred. All holds are used in this style. A fall is won in the same manner as in the *Greco-Roman* style. Two falls in three, or three in five, are usually required for a decision in professional matches. See also HOBBS (Books about Hobbies); JUDO. E.D.M.

WRIGHT, FRANK LLOYD (1869-), became one of the most discussed architects of modern times. Con-

ventional architects have called his designs fantastic and impractical. But these designs have played a major role in the development of modern architecture. Wright's skill in arranging interior spaces has rarely been equaled, and ever since 1909 his influence has been felt throughout the world. He was one of the first architects to break away from the cluttered Victorian style. He developed functional style (called by him "Organic") in which buildings are frankly composed to express their purpose and the materials of which they are built. Wright's houses are roomy and well ordered, with windows placed where they can best catch the light. They have many clever and special arrangements which have been widely imitated. This is also true of his office buildings. In 1905 Wright designed the first office building to use air conditioning, acoustical wall treatment, metal-bound plate-glass doors and windows, and all-metal furniture. One of his best-known works is the Imperial Hotel in Tokyo, Japan. This building was designed to withstand earthquakes. During the 1923 earthquake



Karsh

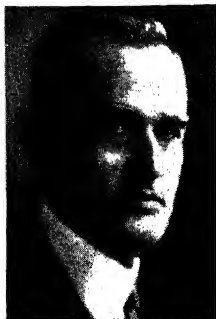
Frank Lloyd Wright, one of the most original of American architects

which destroyed most of Tokyo, the Imperial Hotel was the only large building which survived.

Wright was born at Richland Center, Wis., and studied civil engineering at the University of Wisconsin. In 1888 he began his architectural career in Chicago with the well-known architect Louis H. Sullivan. He received immediate and strong impulse toward modern functional architecture from Sullivan. In 1894 Wright opened his own office and began to astound the world with his unusual and forward-looking designs. K.J.C.

See also BUFFALO (Interesting Places to Visit [Martin House]).

WRIGHT, HAROLD BELL (1872-1944), was a popular American novelist. His books include *The Shepherd of the Hills*, *The Winning of Barbara Worth*, and other sentimental stories with a moral purpose. They do not rank high as literature, but they have been widely read because of their appealing plots and characters.



P&A

Harold Bell Wright, popular American novelist

Wright was born in Rome, N.Y., and studied at Hiram College in Ohio. He spent eleven years as a preacher in Kansas, Missouri, and California. L.C.W.

His Works include *The Calling of Dan Matthews*; *The Eyes of the World*; and *Ma Cinderella*.

WRIGHT, LEMUEL W. (? - ?), invented a pin-making machine on which the modern pin industry is largely based. Little is known of his life. He was a native of New Hampshire, but took out the patent on his machine in England in 1824. His factory in Lambeth failed, but his former partner later used the patent in a factory at Stroud, in Gloucestershire, in 1832 or 1833. Some historians believe that the pins produced there were the first solid-headed pins to be manufactured in England. Wright's machine did not at first make good pin points, but Wright perfected the machinery later. See also PIN.

E.Y.

WRIGHT, ORVILLE (1871-1948), and **WILBUR** (1867-1912), brothers, invented the first successful airplane. On December 17, 1903, they made the world's first flight in a power-driven airplane at Kitty Hawk, N.C. Orville Wright piloted the plane. He flew 120 feet and remained in the air for twelve seconds. Only five persons were interested enough to watch the flight, and few newspapers wrote anything about it. Most persons thought the Wright brothers were crazy. Not even the inventors themselves realized how completely this twelve-second flight would change civilization.

Orville Wright was born in Dayton, Ohio, and his brother Wilbur was born in Millville, Ind. Their father was a bishop of the United Brethren Church. The boys attended high school in Dayton, where they grew up. Wilbur was a bright student, but Orville was a dreamer and took little interest in school. When Orville was twenty-one the brothers opened a bicycle shop and earned their living by selling and repairing bicycles.

In 1896 the Wright brothers read about Otto Lilienthal's death while experimenting with a glider. They became interested in flying and read all the articles they could find on the subject. The Wrights first began to experiment with kites, and later with man-carrying gliders. They worked out their own methods for cutting down wind resistance and achieving balance and control in the air. In 1900 and 1901 they built their first two gliders, but these did not perform according to their plans.

The Wright brothers decided that the gliders had failed because they had been based on wrong air pressure tables. They set up a small wind tunnel in their shop and worked out their own figures. They tested more than 200 wing combinations before they built their third glider. This one performed as expected.

In 1903 they were ready to build a machine which would be driven by its own power and would carry a man. After four flights, the longest of which lasted 59 seconds, a gust of wind blew the machine over and wrecked it. But the Wright brothers had proved that the airplane was a success.

The Wrights continued to work on the airplane, and made many flights near Dayton. In 1905 they flew twenty-four miles in thirty-nine minutes. The following year the brothers received a patent for their invention. They tried to interest people in their flying machine, but no one listened to them. The United States Government thought it impractical and dangerous.

Wilbur Wright went to Europe and interested several foreign governments in the airplane. The United States Government then took a sudden interest in the invention. In 1909 the brothers formed the American Wright Company to manufacture their airplanes.

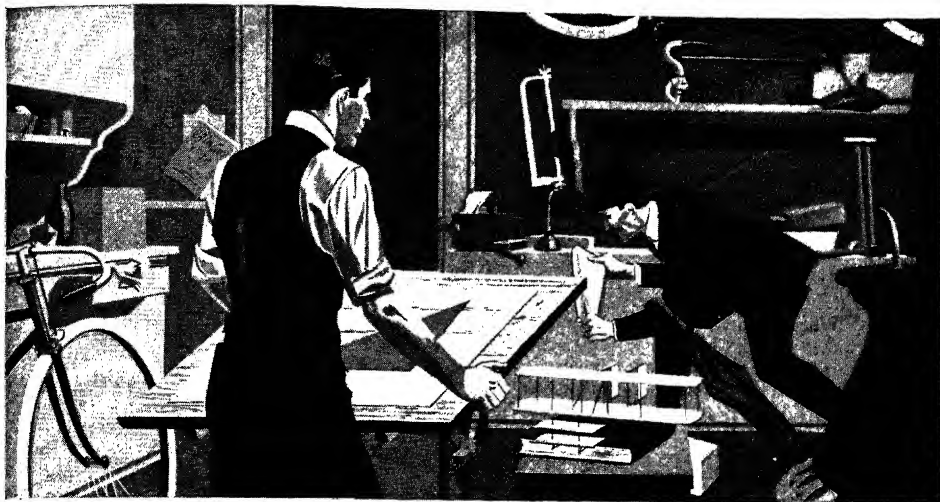
Three years later, just as the airplane was beginning to make great advances, Wilbur Wright died of typhoid fever. Orville worked alone, and in 1913 won the Collier Trophy for a "device for balancing flying machines automatically." In 1915 he sold his interest in the Wright Company and retired from business. But he continued to work on the development of aviation and became director of the Wright Aeronautical Laboratory in Dayton.

M.V.C.

See also AIRPLANE (History of the Airplane); GLIDER (Other Glider Pioneers).

WRIGHT, PATIENCE LOVELL (1725-1786), made portraits in wax of many famous Britons. A bas-relief of King George III in the British Museum is credited to her. She was born in Bordentown, N.J., and was self-taught. A widow with three children, she went to London, and saw the king and queen frequently, perhaps through the friendship of Benjamin Franklin. She is believed to have acted as a spy in England for the American patriots during the Revolutionary War. M.C.C.

WRIGHT, RICHARD (1908-), is one of the best-known of American Negro writers. The son of a poor Negro farmer, he was born near Natchez, Miss. He received little education. His autobiography, *Black Boy*, published in 1945, is the story of the difficult years of his childhood. In 1934 Wright came to Chicago, where he became interested in the labor movement and began to write. In 1937 the Federal Writers' Project published his *Guide to Harlem*.



The Wright Brothers Working on Their Airplane Design, which was soon to revolutionize man's way of travel. The men are trying to solve the problem of how to turn the plane

in flight. One brother is twisting the lid of a shoebox to show how this movement might cause the plane to tilt and turn. The Wright principle was correct, and their airplane could turn.

His work first became well known in 1938 when his novelette *Uncle Tom's Children* won a *Story* magazine prize. A year later his novel *Native Son*, the story of a Chicago Negro, became a best seller. It was made into a successful play in 1941. In 1940 Wright received the Spingarn medal for his contributions to the advancement of Negro interests.

C.H.T.

See also SPINGARN MEDAL.

WRIGHT, WILLARD HUNTINGTON (1888-1939), was an American author, editor, and critic. He is best known for the murder and detective stories which he wrote under the pen name of S. S. Van Dine.

Wright was born in Charlottesville, Va. He was educated at Pomona College in California, and at Harvard University. He served as literary editor and art critic on several newspapers and magazines.

L.G.Wt.

His Works include *The Canary Murder Case*; *The Bishop Murder Case*; *The Casino Murder Case*; and *The Powwow Murder Case*. Other works, written under his own name, include *Songs of Youth*; *The Creative Will*; *The Future of Painting*; and *Modern Literature*.

WRIGHT FIELD, near Dayton, Ohio, is the headquarters for air fields of the Fifth Corps Area of the United States Army Air Forces. The field covers an area of 746 acres five miles east of Dayton. It was established in 1925 and named for the great pioneers in aviation, Wilbur and Orville Wright. Wright Field has an Air Corps research laboratory. The field is manned by an average force of 7,000 officers and enlisted men.

WRIGLEY, WILLIAM, JR. (1861-1932). See CATALINA ISLAND.

WRIOTHESLEY, RIȝlih, **HENRY, EARL OF SOUTHAMPTON** (1573-1624). See SHAKESPEARE, WILLIAM (Poet).

WRIT. In early English, the word *writ* had the same meaning as our present word *written*. Early English-speaking people also called anything in writing a *writ*. Today the word is still sometimes used in that sense.

For example, some persons call the Bible the *Holy Writ*. But generally the word *writ* is now used in its legal meaning only, to describe the written orders of a court of law. If a court orders the sheriff to seize property which someone has wrongfully taken, it furnishes the sheriff with a *writ of replevin*. A *writ of habeas corpus* commands someone having the custody of a person to produce that person for trial. A *writ of error* is an order to a court to send records of a certain trial or proceeding to a superior or appellate court, so that the judgment may be revised, corrected, or affirmed.

S.T.K.

Related Subjects. The reader is also referred to:

Attachment	Mandamus	Subpoena
Habeas Corpus	Quo Warranto	Writ of Assistance
Injunction	Replevin	

WRITER. See JOURNALISM; and the section on Vocational Opportunities in the articles: ADVERTISING; MOTION PICTURE; PUBLISHING; RADIO. For lists of authors, see the BIOGRAPHY section of the READING AND STUDY GUIDE.

WRITING in some form is nearly as old as the human race. Knot writing was one form of primitive communication in which various kinds of knots were tied into rope at intervals. At first, men wrote by drawing pictures of the things they wanted to tell other men about. This kind of writing was called *picture writing*. Later two or more pictures were put together to tell about more things. Picture writing reached its highest state of development among the Egyptians, who engraved their monuments with inscriptions called *hieroglyphics*. Much of our knowledge of ancient times has been gained by translating the hieroglyphics left by the Egyptians. See HIEROGLYPHIC.

From putting pictures together to make symbols, writing passed to the stage in which it is now used. In present-day writing, the symbols stand for sounds, and combinations of the symbols make words. All the symbols which stand for the sounds of a language make

up the alphabet of the language. Writing in which the symbols stand for sounds is called *phonetic* writing.

The Seirites, an ancient people who lived on the Sinai Peninsula in Asia, invented the first phonetic alphabet. It was later taken over by the Phoenicians, who changed it and added to it. The alphabet was used and somewhat changed by the ancient Greeks, and finally by the Romans.

The symbols went through many changes from picture writing to the time they became letters of the alphabet. For example, let us take the letter *A*. The Egyptians drew a picture of an ox's head to represent the letter *A*. Above the head was an arc representing the horns. When the Seirites developed phonetic symbols, they used the ox's head for *A*, but dropped the eyes and ears. The Phoenicians made a geometric figure of the ox's head. They pointed the chin abruptly and changed the horns over the head to a straight line. About 600 B.C., the Greeks turned the symbol around and dropped the part which went beyond the line drawn through the head. By about A.D. 114, the Romans had changed the ox's head to the letter *A* that we know today. See AA.

The order of writing changed with the ages and countries, too. The Egyptian hieroglyphics were written either from left to right, or from right to left. The Greeks at first wrote entirely from left to right, but formed the letters from right to left. Later they imitated the path of a plow in a field. One line went from left to right, and the next line was from right to left.

When the Romans took up alphabetic writing, many different styles were used in the different provinces throughout Italy. But as long ago as 300 years after the birth of Christ, many provinces used letters almost exactly like those we use today. At that time, and for a long time thereafter, only a few persons knew how to

write. Most persons dictated their letters to men known as "scribes," who made writing for the public their profession.

Before printing was known in Europe, authors had to write books with a pen. The only books were *manuscripts*. The word manuscript means *written by hand*. During the Middle Ages, books were written by monks in monasteries. The lettering was often beautifully done on parchment. After the lettering was done on each page, the monk would turn over his work to another monk, known as the *illuminator*. This man drew in beautiful fancy letters, scrolls, borders, and pictures, and colored them with bright colors and gold paint. Many very old manuscripts can be seen in museums today. They are the treasured writings of the past.

After printing was developed, most books were printed, and people used writing only for correspondence and for keeping business books. It became the fashion for wealthy men and women to develop beautiful and individual handwriting. Bookkeepers and shopkeepers gradually did away with the slow and painstaking manuscript style of writing, which is much like printing. Instead, they began to run their letters together in the faster style of handwriting, called *cursive writing*.

Then cursive writing courses took the place of manuscript writing in schools, and children were taught a clear, flowing penmanship. In the early 1900's, some schools in the United States did away with penmanship classes and taught typewriting or printing instead. But it was soon found that young people who grew up without a knowledge of penmanship were seriously handicapped. Today, penmanship is taught in almost all schools, and every young man or woman who wants to succeed in the world must know how to read and write longhand.

E.L.S.W.



Egyptian Hieroglyphic Writing Carved on a Block of Limestone More than 4,000 Years Ago

University Museum, Philadelphia



Books Were Written by Hand before Printing Was Known

Related Subjects. The reader is also referred to:

Alphabet	Paleography
Braille	Pen
Codes and Ciphers	Pencil
Composition (with list)	Phonetics
Cuneiform	Pictograph
Handwriting	Rune
Ideogram	Shorthand
Manuscript	Stylus

WRIT OF ASSISTANCE. In colonial days the British Government provided customs officials in America with general search warrants. These warrants were called *writs of assistance*. The customs officials used them to enforce the collection of import duties and to seize goods upon which no duty had been paid. The writs were different from ordinary search warrants which authorized the officers only to seize specified goods within a certain time and at a stated place. The writs of assistance permitted the officers to search for suspected goods at any time in any place. In 1767 the writs were declared legal by Act of Parliament. But James Otis and other American leaders aroused the colonists against the writs, and they were rarely used.

In modern law, a writ of assistance is an order issued by a court of equity to a sheriff, commanding him to turn over certain real estate to the person entitled to possession.

WRONG, GEORGE MacKINNON (1860-). See CANADIAN LITERATURE (History of English-Canadian Literature [Twentieth Century]).

WROUGHT IRON. See ALLOY (Alloys of Iron).

WRYNECK, RI nek. See RHEUMATISM.

WRYNECK, or SNAKEBIRD. The wryneck is a small mottled brown bird that lives in the Old World. It is a

relative of the woodpeckers, and nests in the natural hollows of trees. When something disturbs the wryneck, it thrusts its head and neck out of its nest, and hisses. Its name comes from the twisting motion of its neck when it does this.

Unlike a woodpecker, the wryneck has soft tail feathers. Its beak is short and cone-shaped, and its tongue has a horny point. The tail is short and rounded. The wryneck sometimes catches ants and other insects on the ground by darting out its wormlike tongue. A.A.A.

Classification. Wrynecks belong to the family *Picidae*. The common species described above is *Jynx torquilla*. There are three additional species found in Africa.

WULFENITE, WOOL fen ite. See MINERAL (color plate).

WUNDT, voont, WILHELM (1832-1920), was a German philosopher who is called the "Father of Modern Psychology." He founded the first laboratory for experimental psychology. Wundt was born in Neckarau, in Baden, and taught philosophy at the University of Leipzig. B.B.

WUPATKI, woo PAT kih, NATIONAL MONUMENT.

See NATIONAL MONUMENT.

WUPPERTAL. See GERMANY (Cities).

WÜRTTEMBERG, VUR tem berk, is a state in southwestern Germany, situated between Bavaria and Baden. Lake Constance separates Württemberg from Switzerland. The state covers an area of 7,530 square miles, and has a population of 2,907,166.

Württemberg forms the western part of South Germany's upland regions. It is a country of hills and mountains. Sections of the famous Black Forest cover the southwestern part of the state. The Danube River winds across Württemberg from the southwest to the north-



The Wryneck, or Snakebird



Location Map of Württemberg

east, and there are many mineral springs throughout the territory.

Most of the people in Württemberg work at some kind of farming. The chief products include potatoes, barley, clover, oats, hay, and beets. Fruit raising and dairying are also important occupations. Manufactured products include sugar, iron, textiles, gold, silver, chemicals, musical instruments, bells, and paper. Württemberg is the book-publishing center of southern Germany.

Württemberg became part of the new German Empire in 1871. The state was long one of the important centers of the liberal and trade-union movement in Germany. When the Nazis came to power in 1933, the constitution and people's government of Württemberg were set aside, and the state was ruled by a personal representative of Adolf Hitler.

T.Z.

WU T'ING-FANG, *woo ting fahng* (1842-1922), was a Chinese diplomat and statesman. He served three times as Chinese Minister to the United States.

Wu was educated at Saint Paul's College in Hongkong, and studied law at Lincoln's Inn in London. He practiced law for a time in Hong Kong, but in 1882, his abilities secured him an appointment as a member of the official staff of Li Hung-chang, grand Chancellor of the Manchu Emperor of China. Wu helped negotiate the peace treaty with Japan in 1895, and was named Minister to the United States the next year.

In 1902 Wu was called back to China to help make commercial treaties with several foreign countries. In 1908 he returned to the United States as minister again, but stayed only a year. In 1911 he served for a time in Nanking and Shanghai as a spokesman for the revolutionists. The next year he returned to the United States once more as minister. In 1918 he was associated with the Chinese revolutionary leader, Sun Yat-sen, in his government in South China.

H.F.MACN.

WYANDOT, *WI an daht*, or **WYANDOTTE**, INDIAN. See HURON.

WYANDOTTE CAVE is a picturesque natural cavern in the limestone region of the Ohio River Valley. The cave is situated five miles northeast of Leavenworth, Ind., in Crawford County. The remarkable stalactite formations in Wyandotte Cave are said to be greater in number and more beautiful than those of Mammoth Cave, in Kentucky. Thirty-five miles of underground passages and large chambers have been explored in Wyandotte Cave. Monument Mountain is a great pile of limestone blocks on the floor of Rothrock's Cathedral, which is 1,300 feet around and 225 feet high. The Pillared Palace has beautiful clusters of stalactites and stalagmites.

E.D.W.

WYCHERLEY, *WICH er lih*, **WILLIAM**. See DRAMA (The English Theater).

WYCLIFFE, or **WICLIF**, *WIK lif*, **JOHN** (about 1320-1384), was an English religious reformer and the first person to begin a systematic translation of the entire Bible into English. He was popularly called "The Morning Star of the Reformation" because of his vigorous protests against certain practices of the Roman Catholic Church.

Little is known of Wycliffe's early life, but it is believed that he was born near Richmond, in Yorkshire, England. He studied at Oxford University and became master of Balliol College in about 1358. He later held several teaching positions.

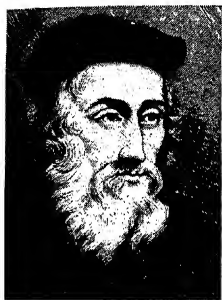
Wycliffe found much to criticize in the Church. He believed that it exercised too much control over civil affairs, and he supported the antipapal policies of John of Gaunt. Wycliffe's work won the favor of Edward III. In 1374 the king sent him to meet representatives of Pope Gregory XI at Bruges, Belgium, to settle disputes between the English government and the Papacy over



Guides and Visitors Inspect Formations in the Crystal Vault of Wyandotte Cave in Southern Indiana

the question of Church authority. But few agreements were reached.

Opposition to the Church. Soon after Wycliffe returned to England he began attacking the doctrines as well as the established order and hierarchy of the Church. One of his chief points was that the individual



Newberry Library

John Wycliffe, English religious reformer

Christian can make his own appeals to God, and does not need to appeal to God indirectly through a priest. Wycliffe became convinced that a person should build his beliefs on the teachings of the Bible and on his own reason. The Church considered his teachings dangerous and pronounced him a heretic. In 1377 Pope Gregory XI issued five papal bulls, or decrees, attacking him, and demanded his imprisonment. But the English government refused the demands and allowed Wycliffe to go free.

He continued to emphasize the importance of individual rights and the need for separating the Church from the state. Many of his beliefs were similar to those Martin Luther taught in Germany more than a hundred years later.

Translation of the Bible. The peasants' revolt of 1381 convinced Wycliffe that he should appeal directly to the common people. He soon began a translation of the Bible into English. He thought it was necessary for the people to read the Bible themselves in order to know the source of their religious beliefs and to apply the teachings of Christ to everyday life. Scholars question how much of the work of translation was done by Wycliffe himself. He probably translated the New Testament and part of the Old Testament. His associates are believed to have completed the rest of the works. John Purvey published the entire translation in about 1388. This translation was a new and important forward step. It set the standard for the English prose that followed and it opened the way for personal freedom of worship.

One group of his followers was called "poor priests." They received instructions from Wycliffe and then set out on foot to tell the people the message of the Bible. These priests traveled about the countryside much like the Apostles of old.

The Lollards. After about 1387, the followers of Wycliffe became known as *Lollards*. During the 1400's the Lollards were persecuted cruelly and many were burned at the stake. But their numbers continued to increase, and at the time of Henry VIII in the 1500's they played a large part in spreading the doctrines of the Reformation.

Wycliffe's teachings brought him trouble with the Church most of his life. But he always escaped punishment through the protection of the English government. In 1384 he suffered a paralytic stroke, died, and was buried at Lutterworth. In 1428, at the command of

Pope Martin V, his body was removed from the grave and burned, and the ashes were scattered upon the waters of the River Swift.

W.W.S.

See also **LITERATURE** (illustration); **LOLLARD**; **REFORMATION** (Causes of the Reformation).

His Works. Most of Wycliffe's writings were in Latin, such as *De Dominio Divino* and *De Civili Dominio*.

WYETH, NEWELL CONVERS (1882-1945), was an American artist. He painted many historical murals, but he is perhaps best known for his illustrations. Wyeth painted the pictures for twenty children's books, including *Treasure Island* and *Robinson Crusoe*.

Wyeth was born in Needham, Mass., and studied at the Massachusetts Normal Art School. At nineteen he became a student of the noted illustrator, Howard Pyle, in Wilmington, Del. Later Wyeth lived in Colorado and New Mexico and painted pictures of frontier life. Wyeth also lived with the Indians and studied their



James L. Dillon & Co.

Newell C. Wyeth gives finishing touches to an illustration which shows Columbus discovering America.

ways of living. On his return to Wilmington his paintings and sketches became an immediate success. H.Bo.

WYLIE, ELINOR MORTON HOYT (1885-1928), was an American poet and novelist. Both her prose and verse are noted for wit, delicacy, and intensity of feeling. She was born in Rosemont, Pa., and was privately educated. All her writings—four books of poems, four novels, and many short stories—were done in eight years. She died a few hours after her last and perhaps best book of poems, *Angels and Earthly Creatures*, had been finished. See also **BENÉT** (William Rose). L.U.



Alfred A. Knopf, Inc.

Elinor Wylie, modern American poet

Her Works have been assembled in *Collected Poems* and *Collected Prose*.

WYNDHAM, WIND am, SISTERS. See **PAINTING** (color plate, Great American Paintings).



WYOMING THE EQUALITY STATE

WYOMING, *wy O ming*, is named for the Wyoming Valley in Pennsylvania. The name is taken from a Delaware Indian word, *maughwauwame*, which means *great plain*, or *upon the great plains*. Wyoming has long been known as **THE EQUALITY STATE** because women were given the right to vote in 1869, one year after Wyoming was organized as a territory and fifty-one years before women could vote generally in the United States.

Wyoming is a land of magnificent distances, of high plains in the east, and jagged mountain peaks in the west. Within its borders are great stretches of prairie grass, desert land thinly covered with sagebrush, oddly carved badlands of the northeast, the mountain regions with their evergreen forests, and cultivated fields in the great basins.

This region of natural grandeur was the scene of a colorful drama of American development. Explorers, wilderness scouts, fur trappers, and traders moved across it in pioneer days searching for passes through the mountain wall to the Pacific. Long wagon trains, winding over the plains and the mountains along the Oregon Trail, came to extend the borders of the United States to the western coast.

The frontier is still remembered by the people, because Wyoming was settled late, nearly two hundred and fifty years after colonies were established on the eastern coast. Such names as Cheyenne, Laramie, Powder River, Medicine Bow, and Big Horn are symbols of the romance and color of pioneer days. The early history of the region is lived again each year, in almost every city and town of the state, by means of celebrations known as stampedes, roundups, Frontier Days, rodeos, and Chuck Wagon Days.

The unfenced grasslands of Wyoming were once the cattleman's kingdom, where cowboys sang their lonely ballads as they rode herd on the longhorns which they brought up from Texas for fattening. Great herds of cattle still graze on the mountain slopes and basins in summer. But many acres have been fenced in for farming, and thousands of sheep now graze on the plains. Wyoming ranks high in the raising of beef cattle, and usually stands in second place with Montana (after Texas) in the production of wool. It is one of the leading producers of eggs and turkeys among the

states, and grows great quantities of beets and hay.

The forests of the mountain regions produce huge amounts of railroad ties and lumber. Wyoming has some of the most important mineral reserves in the United States, with valuable deposits of clay, vanadium, bauxite, asbestos, and alumina. Great wealth comes from its oil and natural-gas wells and its many coal mines, and it digs more iron ore than any other Rocky Mountain state.

To hundreds of thousands of visitors, Wyoming means Yellowstone National Park, one of the most amazing wonderlands in the world, most of which lies in this state. Here are spouting geysers and bubbling hot springs, whose pools and terraces are tinted with all the colors of the rainbow. Great waterfalls dash down steep-walled canyons. Deep, forested wildernesses are the home of grizzly bears and black bears. Mountain meadows are feeding grounds for deer, moose, and elk. Sure-footed sheep live on the high rocky places. Grand Teton National Park, another of Wyoming's great natural playgrounds, is also a region of great beauty.

The Land and Its Resources

Extent: Area, 97,914 square miles (408 square miles of which are inland water), eighth in size among the states. *Greatest length* (north to south), 275 miles; *greatest width* (east to west), 365 miles.

Physical Features: *Chief Rocky Mountain ranges*, Absaroka, Big Horn, Gros Ventre, Laramie, Medicine Bow, Rattlesnake, Salt River, Seminoe, Snake River, Sweetwater, Teton, Wind River. *Chief peaks*, Atlantic (12,734 feet), Bridger (11,007 feet), Cloud, (13,165 feet), Doubletop (11,715 feet), Frank's (13,140 feet), Fremont (13,730 feet), Gannett (13,785 feet), Grand Teton (13,766 feet), Index (11,738 feet), Medicine Bow (12,005 feet), Wyoming (11,363 feet). *Elevation*, highest, Gannett Peak in Fremont County, 13,785 feet above sea level; lowest, Belle Fourche River in Crook County, 3,100 feet above sea level. *Chief rivers*, Big Horn (chief tributary, Shoshone), Powder, Green, North Platte (chief tributaries, Laramie, Sweetwater). *Chief lakes*, Yellowstone,

Pronunciation Guide

Absaroka	AB sah RO kah	Nez Percé	NAY PER SAY
Belle Fourche	bel foorsh	Teton	TE tahn
Gros Ventre	groh VEN t'v	Verendrye	veh RAHN DREE
Laramie	LAR ah mih	Washakie	WAHSH ah kee



YELLOWSTONE—FIRST NATIONAL PARK

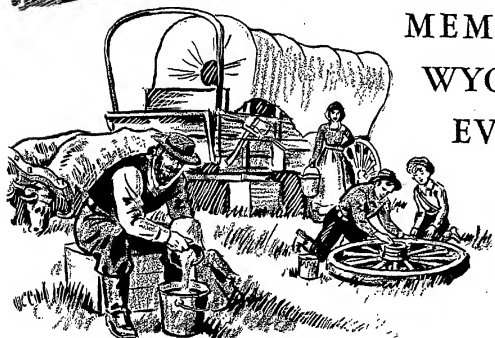
In 1872, the United States Government established Yellowstone National Park in the northwest corner of the state "for the benefit and enjoyment of the people." This region, the first of the national parks, was discovered by John Colter, a trapper, in 1807

EQUAL RIGHTS FOR WOMEN

Since 1869, Wyoming has extended to men and women the right to vote on equal terms. In 1870, Esther M. Morris of South Pass City became the first woman justice of the peace in the United States and, in 1924, Nellie Tayloe Ross the first woman governor.



MEMORABLE WYOMING EVENTS



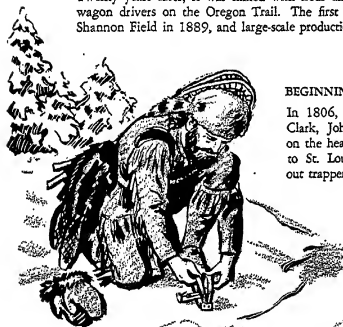
GROWTH OF THE OIL INDUSTRY

Oil was first discovered in the state in 1832 by Captain Bonneville. Twenty years later, it was mixed with flour and sold as axle grease to wagon drivers on the Oregon Trail. The first well was drilled in the Shannon Field in 1889, and large-scale production developed after 1910.



OREGON TRAIL DAYS

Between 1840 and 1870, more than 300,000 travelers passed through Wyoming on the overland trails. Fort Laramie, built in 1834 by William Sublette, and Fort Bridger, built in 1843 by Jim Bridger, became important stopping places along the way because they offered protection against hostile Indians.



BEGINNING OF THE FUR TRADE

In 1806, while on his way east with Lewis and Clark, John Colter was given permission to trap on the headwaters of the Missouri. After his return to St. Louis in 1808, fur-trading companies sent out trappers and traders to the Yellowstone country.

CROSSING THE ROCKIES

In 1832, Captain Bonneville and a company of soldiers blazed the first wagon route across the Rockies to the Green River by way of the South Pass, the gateway to the Pacific. This was the route followed by those who rushed to the California gold fields in the early 1850's.



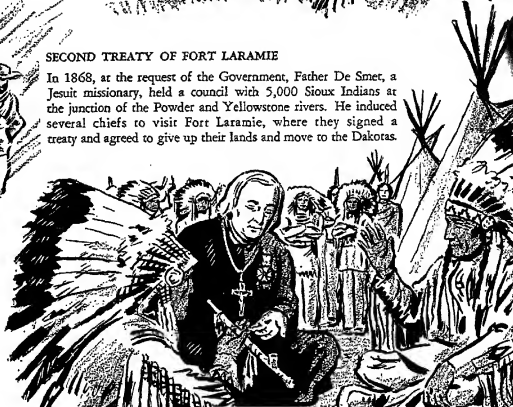
SECOND TREATY OF FORT LARAMIE

In 1868, at the request of the Government, Father De Smet, a Jesuit missionary, held a council with 5,000 Sioux Indians at the junction of the Powder and Yellowstone rivers. He induced several chiefs to visit Fort Laramie, where they signed a treaty and agreed to give up their lands and move to the Dakotas.



BEGINNING OF THE CATTLE INDUSTRY

In the early 1870's, Wyoming became the center of the open range country. It is said that traders, caught by early snows, turned loose their oxen to die but to their surprise found them fat and sleek in the spring. By 1890, sheep, first introduced in 1845, had become increasingly important.



Jackson, Shoshone. *Chief waterfalls*, Upper Yellowstone, Lower Yellowstone. *Chief buttes*, Black Butte, Church Buttes, Crowheart Butte, Devils Tower, Missouri Buttes, Rawhide Buttes, Red Butte.

Climate. *Temperature*, average annual 41.8° F.; average summer, 62.7° F.; average winter, 21.5° F.; lowest on record, -66° F. at Yellowstone Park (Feb., 1933); highest on record, 114° F. at Basin (July, 1900). *Pr* average annual, 13.63 inches; average Apr. 1 to Sep. 8.74 inches; average Oct. 1 to Mar. 31, 5.19 inches. *Sn* fall, average annual, 65.3 inches, ranging from 56.1 in the south to 69.5 in the north.

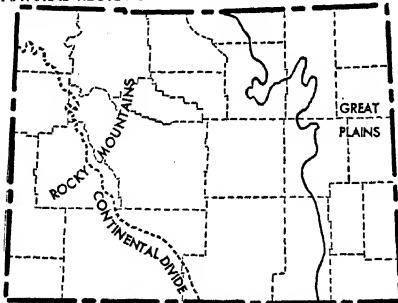
Size, and Surface Features. Wyoming lies where the Great Plains meet the Rockies. The Continental Divide, which separates waters flowing east from those flowing to the Pacific, runs through several of its western counties. The state is twice the size of New York, and nearly ten times as large as Connecticut. Yellowstone National Park, which covers a fairly small area in the northwest corner, is about one thousand square miles bigger than Delaware. Wyoming is the only state besides Colorado whose borders form an exact rectangle. For the boundaries of the state, see the colored map.

Wyoming lies at an average elevation of 6,700 feet and is higher than any other state except Colorado. The state is divided into two natural regions, the Great Plains and the Rocky Mountains.

The *Great Plains* region is generally level, and varies from half a mile to a mile in elevation. Much of the dry land is covered with short, tough grass which is suitable for grazing, except along the rivers, where thickets of brush and a few cottonwoods grow. In the south-central part, irrigation has turned large desert areas into fertile farming country.

Columns of lava rock, called buttes, rise sharply above the level plain. The largest of these is Devils Tower, in the Belle Fourche River Valley. East of Devils Tower, the flat plains are broken by badlands, where wind-blown sand and rain have carved the soft rock into

NATURAL REGIONS



strange peaks and castles. The Black Hills rise beyond the badlands. All but a narrow strip of the Black Hills lie in the neighboring state of South Dakota.

The *Rocky Mountains* sweep upward like a wall from the floor of the plains. Only a ridge of hogback hills, so named because of their rounded shape, lie between the valleys and the mountains. In the north, the mountain wall is formed by the towering heights of the Big Horn Mountains. To the south, the Laramie Range forms the wall. The Medicine Bow Mountains rise west

of the Laramie Range, and many smaller ranges criss-cross the basins between these two groups. The Absaroka Range lies along Yellowstone Park on the east. The Wind River Range is to the south and east of these mountains. It contains the two highest mountains in Wyoming, Gannett Peak (13,785 feet), and Emment Peak (13,730 feet). Near the western border, the Gros Ventre, Shoshone, and Teton Mountains lift their jagged peaks.

Wide treeless basins lie between the snow-capped ridges and lofty peaks. Some of the basins, such as the Big Horn Basin and Star Valley, have thick growths of grass for grazing herds and contain good farm land. Others, such as the Great Divide Basin, which includes the Red Desert, are cut off from moisture-laden winds and are extremely dry. Cattle grazing is not important in these sections, since it would take about fifty acres to support one cow. Even sheep find little to eat. When the land is irrigated, it produces abundantly because of its rich supply of phosphorous and other natural fertilizers. This region is rich in minerals, including petroleum, coal, gypsum, gold, silver, copper, and asbestos.

Rivers and Lakes. Three great river systems have their sources in the mountains of Wyoming. They are the Missouri, the Colorado, and the Columbia. The Yellowstone, the Big Horn, the Powder, and the Shoshone flow north. The Belle Fourche flows northeast, and the North Platte, fed by the Laramie and Sweetwater, flows east. All these streams run into the Missouri. The Green River cuts across the southwest corner of the state, and is the main source stream of the Colorado. The Snake River rises in Shoshone Lake and forms a magnificent canyon as it breaks through the Salt River Mountains and the Teton Mountains to join the westward-flowing Columbia. The Continental Divide rises between the Missouri and the Columbia basins.

There are no navigable rivers in Wyoming because all of them drop from sheer heights in great cascades, over rocky cliffs, and down steep gorges and canyons. Then they shrink to shallow, muddy channels as they cross the Great Plains. Among the most famous cascades are the upper and lower falls of the Yellowstone River.

No streams flow outward in the Great Divide Basin to the south, but all are swallowed up by lakes among the desert sands. In Natrona County there are two soda lakes, where the alkaline deposits form heavy crusts when the water dries up in summer. These crusts are cut into blocks three or four feet thick for commercial use, and other crusts soon take the place of those cut.

Yellowstone, Jackson, and Shoshone are the largest of the mountain lakes. Their clear waters reflect the snowy peaks and forested slopes of the surrounding mountain ranges. The Shoshone Reservoir, which is formed by a dam on the lower Shoshone River, and the waters which are held back behind the Alcova, Diversion, Jackson Lake, and Seminoe dams provide electric power and supply water for the irrigation systems.

Climate. The dry, sunny climate of Wyoming is healthful and pleasant the year round. There are periods of intense cold, most frequent in January, and of intense heat in July and August. But they are less keenly felt than in many other places in the same latitude be-

WYOMING

Total Population 250,742

Acme, (E1).....	220	Cowley, (D1).....	491	Halfway, (B3)....	46	Mayoworth, (F2)...	6	Seely, (H1).....	8
Adon, (G1).....	27	Croton, (G1).....	10	Hamilton Dome,		Meadowdale, (H3)...	45	Seminole Dam, (E3)...	9
Afton, (B3).....	1,211	Daniel, (B1).....	49	(D2).....	83	Medicine Bow, (F4)...	338	Shawnee, (G3).....	106
Akwonasa, (B4)....	10	Dayton, (E1).....	240	Hanna, (F4).....	1,127	Meeteetse, (D1).....	373	Shelby, (E1).....	73
Aladdin, (H1).....	92	Deaver, (D1).....	111	Hartville, (H3)...	179	Meriden, (H1).....	24	Sheridan, (F1).....	10,529
Albany, (F4).....	110	Devils Tower, (H1),	54	Hat Creek, (H3)...	67	Merna, (B3).....	14	Shrley, (F3).....	15
Albin, (H4).....	160	Diamond G Ranch,		Flak Springs, (H4)	117	Midwest, (F2).....	866	Shoshoni, (D2).....	226
Alcova, (F3).....		(C2).....		Hiland, (E2).....	28	Mills, (F3).....	379	Sinclair, (Paroo),	
Alva, (H1).....	35	Diamondville, (B4),	586	Hillsdale, (H4)...	145	Mona, (H1).....	12	(E4).....	604
Anchor, (D2).....	12	Dickie, (D1).....	7	Hoback, (B2).....	13	Monarch, (F1).....	497	Slater, (H4).....	34
Arapahoe, (D3)...	111	Dines, (C4).....	308	Holmes, (F4).....	28	Moneta, (E2).....	25	Smoot, (B3).....	355
Arcola, (H4).....	12	Divide, (H4).....	99	Holm Lodge, (C1)...	4	Moorecroft, (H1)...	387	South Pass City,	
Arlington, (E2)...	25	Dixon, (E4).....	94	Horse Creek, (C4)...	90	Moose, (B2).....	33	(D3).....	43
Arminto, (F4).....	74	Douglas, (G3).....	2,205	Horton, (H1).....	85	Moran, (B2).....	91	South Superior,	
Arvada, (F1).....	133	Dubois, (C2).....	412	Hudson, (D3).....	330	Morton, (D2).....		(D4).....	885
Aspen Tunnel, (B4),	6	Dull Center, (H2)...	5	Hulett, (H1).....	147	Moskee, (H1).....		Speer, (H4).....	7
Atlantic City, (D3),	113	Duncan, (C2).....	34	Huntley, (H4).....	62	Mountainview, (B4)	223	Spencer, (H2).....	32
Auburn, (B3).....	327	Du Noir, (C2).....	300	Hyattville, (E1)...	112	Natrona, (F2).....	113	Split Rock, (E3)...	4
Badger Basin, (C1),	72	Dwyer, (G3).....	351	Indianhill, (H4)...	29	Natwick, (H4).....	8	Spotted Horse, (G1),	16
Beggs, (E4).....	221	Echeta, (G1).....	10	Iron Mountain,		Newcastle, (H2)...	1,962	Story, (F1).....	235
Beirail, (E3).....	333	Eden, (C3).....	66	(G4).....	25	New Haven, (H1)...	21	Stroner, (H1).....	8
Banner, (F1).....	62	Edgerton, (F2)...	232	Isahwooa, (C1)...	132	Node, (H3).....	95	Sublet (Quealy),	
Basin, (E1).....	1,099	Egbert, (H4).....	60	Jackson, (B2)...	1,046	Nugget, (B4).....	4	(B4).....	462
Bear Creek, (G2)...	3	Elk, (B2).....	73	Jay Em, (H3).....	42	Oakley, (B4).....	418	Sundance, (H1)...	685
Bedford, (B3).....	335	Elk Basin, (D1)...	97	Jelm, (G4).....	23	Old Faithful, (B1)...		Sunrise, (H3).....	981
Beulah, (H1).....	87	Elk Mountain, (F4),	107	Jenny Lake, (B2)...	40	Opal, (B4).....	78	Sunshine, (C1)...	17
Big Horn, (E1)...	165	Elkol, (B4).....	33	Jireh, (H3).....	13	Orin, (G3).....	56	Superior, (D4)...	1,240
Big Piney, (B3)...	241	Elmo, (F4).....	134	Kane, (D1).....	40	Oriva, (G1).....	11	Sussex, (F2).....	12
Big Sandy, (C3)...	39	Emblem, (D1)...	86	Kaycee, (F2).....	210	Orpha, (G3).....	31	Tackla, (G2).....	41
Bigtrails, (E2)...	8	Encampment, (F4)	331	Kearney, (F1)...	26	Osage, (H2).....	479	Ten Sleep, (E1)...	345
Bill, (G2).....	78	Ervay, (E3).....	7	Keeline, (H3).....	111	Oshoto, (H1).....	63	Thayer Junction,	
Bitter Creek, (D4)...	107	Esterbrook, (G3)...	11	Kelly, (B2).....	60	Otto, (D1).....	96	(D4).....	20
Blazon, (B4).....	9	Echete, (D2).....	109	Kemmerer, (B4)...	2,026	Painter, (C1).....	29	Thayne, (B3).....	269
Bondurant, (B2)...	45	Etna, (B2).....	329	Kendall, (B2)...	103	Parco (Sinclair),		Thermopolis, (H)	
Bonneville, (E2)...	35	Evanson, (B4)...	3,605	Kirby, (D2).....	107	(E4).....	604	(D2).....	2,422
Border, (B3).....	103	Evansville, (F3)...	206	Kirtley, (H3).....	30	Parkerton, (G3)...	98	Thornton, (H1)...	35
Bosler, (G4).....	59	Fairview, (B3)...	445	Knight, (B4).....	45	Parkman, (E1)...	103	Thumb, (B1).....	9
Boulder, (C3)...	30	Farson, (C3).....	141	Kyle, (F4).....	3	Passaic, (F1)...	3	Tie Siding, (G4)...	14
Boxelder, (D3)...	19	Federal, (H4)...	25	La Barge, (B3)...	218	Pavilion, (D2)...	176	Torrington, (H3)...	2,344
Boysen, (G2).....	14	Fishing Bridge, (B1)	10	Lagrange, (H4)...	211	Piedmont, (B4)...	80	Tower Falls, (B1)...	2
Bright, (H2).....	8	Flattop, (H3).....	110	Lake Outlet, (B1)...	10	Pine Bluffs, (H4)...	771	Tullis, (E4).....	17
Brilliant, (B4)...	23	Fletcher Park, (G3),	9	Lamont, (E3).....	83	Pinedale, (C3)...	641	Turnercrest, (G2)...	36
Buckhorn, (H1)...	20	Fontenelle, (B3)...	10	Lance Creek, (H3)...	676	Pine Tree, (C2)...	12	Turnerville, (B3)...	103
Buffalo, (F1).....	2,302	Fort Bridger, (B4),	165	Lander, (D3).....	2,594	Pitchfork, (C1)...	21	Ucross, (F1).....	141
Buford, (G4).....	94	Fort Fred Steele,		Laramie, (G4).....	10,627	Point of Rocks,		Ulm, (F1).....	75
Burlington, (D1)...	261	(E4).....	38	Lawver, (G2).....	48	(D4).....	26	Underwood, (G4)...	9
Burns, (H4).....	253	Fort Laramie, (H3),	311	Leiter, (F1).....	38	Powder River, (F2),	93	Upton, (H1).....	545
Burriss, (C2).....	37	Fort Warren, (H4)...	890	Lenore, (C2).....	6	Powell, (D1).....	1,948	Urie, (B4).....	37
Byron, (D1).....	388	Fort Washakie,		Leo, (F3).....	109	Quealy (Sublet),		Uva, (H3).....	49
Calpet, (B3).....	86	(C2).....	1,963	Le Roy, (B4).....	5	(B4).....	462	Valley, (C1).....	29
Camp Ferris, (E3)...	22	Fossil, (B4).....	75	Leverett, (H2)...	7	Jealy, (C4).....	150	Van Tassel, (H3)...	82
Canyon, (B1).....	9	Four Corners, (H1),	7	Lindbergh, (H4)...	32	alston, (D1).....	24	Verse, (G2).....	12
Careyhurst, (G3)...	33	Foxpark, (F4).....	53	Lingle, (H3).....	428	Ranchester, (E1)...	189	Veteran, (H4)...	224
Carlie, (H1).....	27	Frannie, (D1).....	108	Little Bear, (H4)...	11	Rawlins, (E4).....	5,531	Walcott, (F4)...	56
Carpenter, (H4)...	115	Freedom, (B3)...	475	Little Medicine,		Recluse, (C1).....	17	Walmun, (E2)...	38
Carter, (B4).....	78	Freeland, (F3)...	8	(G3).....	18	Reliance, (C4)...	710	Wamsutter, (E4)...	169
Casper, (F3).....	17,964	Frontier, (B4)...	525	Lonetree, (B4)...	71	Richards, (E2)...	5	Wapiti, (C1).....	73
Cassa, (G3).....	17	Garland, (D1)...	86	Lookout, (G4)...	15	Riverside, (F4)...	68	Wendover, (H3)...	109
Centennial, (F4)...	114	Garrett, (G2)...	48	Lost Cabin, (E2)...	34	Riverton, (D2)...	2,540	Weston, (G1).....	89
CHEYENNE,		Gebo, (D3).....	897	Lost Spring, (G3)...	38	Robertson, (B4)...	158	Wheatland, (H3)...	2,110
(H4).....	22,474	Gillette, (G1).....	2,177	Lovell, (D1).....	2,175	Rockeagle, (H3)...	108	Whitman, (H3)...	3
Chugwater, (H4)...	245	Glendo, (G3).....	162	Lucerne, (D2)...	148	Rock River, (G4)...	349	Wild Cat, (B1)...	19
Churcho Buttes, (C4)	14	Glenrock, (G3)...	1,014	Lusk, (H3).....	1,814	Rock Springs, (C4),	9,827	Wilson, (B2).....	157
Clareton, (H2)...	26	Goose Egg, (F3)...	5	Lyman, (B4).....	378	Rockypoint, (G1)...	87	Winchester, (E2)...	64
Clark, (C1).....	120	Granger, (C4).....	163	Lysite, (E2).....	87	Ross, (G2).....	25	Wind River, (D3)...	84
Clearmont, (F1)...	215	Granite Canon, (G4)	88	McFadden, (F4)...	222	Rozet, (G1).....	43	Winton, (C4)...	309
Clifton, (H2).....	11	Grass Creek, (D2)...	480	McKinley, (H3)...	5	Ryan Park, (F4)...	49	Wolf, (E1).....	77
Cody, (C1).....	2,536	Green River, (C4)...	2,640	McKinnon, (C4)...	123	Saddlestring, (F1)...	6	Worldand, (E1)...	2,710
Cokeville, (B3)...	452	Greybull, (E1)...	1,828	Manderson, (E1)...	130	Sage, (B4).....	23	Wright, (G2)...	6
Colony, (H1).....	24	Grover, (B3).....	222	Manville, (H3)...	240	Saint Stevens, (D3),	14	Wyarno, (F1)...	56
Columbine, (F2)...	86	Grovont, (B2)...	44	Marbleton, (B3)...	43	Saratoga, (F4)...	810	Yellowstone Park,	
Como, (F4).....	6	Guernsey, (H3)...	603	Marshall, (G3)...	10	Savaget, (G2)...	13	(B1).....	239
Cora, (C3).....	64	Gunn, (C4).....	36	Mason, (B3).....	7	Savery, (E4).....	51	Yoder, (H4).....	201

© County seat.

cause the air contains so little moisture. Snowfall is light, except on mountain peaks and in the high valleys. The yearly rainfall is so light that Wyoming is one of the driest states in the Union. The mountain snows and springs feed many streams and support forests. But irrigation is necessary for crop raising in all areas except along the riverbanks. In the mountains, cloudbursts and sudden hailstorms and thunderstorms are common. In summer, frequent electrical storms, without clouds or rain, make mountain climbing dangerous. In winter, blizzards occur with little warning. The prevailing summer winds are from the south and southwest, except in the northeast corner, where they blow from the southeast. The winter winds blow from the northeast over most of the state, but from the northwest in the northeast section.

Natural Resources. Wyoming's mineral resources include deposits of coal, petroleum, natural gas, iron, gold, copper, silver, lead, aluminum ores, asbestos rock, clay, phosphates, sodium salts, and building stones. The soil is fertile on the Great Plains and in the basins between the mountain ranges, and the irrigated land grows abundant crops. Water resources for irrigation and electric power have been only partly used.

Wyoming has important reserves of new timber in the mountain areas, although it is almost impossible to reach some of the forests because the land is so rough. The pines, including the yellow, white, whitebark, lodgepole, and ponderosa varieties, are most abundant on the lower slopes. Douglas fir and blue and Engelmann's spruce stand above the pines. The Engelmann's spruce is the most abundant tree in the region. It climbs to the very edge of the timber line. Quaking aspens grow at the edges of the meadows and sunny clearings, and along the banks of streams beside the mountain ash. Cottonwood and willow are found on the banks of the rivers.

The forests give homes to many wild animals. The mountain lion, grizzly bear, black bear, and Canada lynx roam the higher slopes, and mountain sheep live among the rocky crags. Moose may be seen around mountain lakes. Herds of elk and mule deer are common on the lower slopes, especially in winter. The pronghorn antelope bounds over the plains. The beaver, marten, raccoon, and otter are most important for their pelts. The sage hen is the most common game bird.

Fifteen species of the native fish are caught for food. Cutthroat trout, whitefish, crappie, perch, bullhead, and sunfish are found in the greatest numbers. Fork-tailed channel catfish and sand pike are common on the North Platte and Wind Rivers.

Conservation and Development. The first territorial legislature which met in 1869 adopted laws to protect wildlife in Wyoming. These laws were especially needed at a time when many settlers depended on hunting for their food. Closed seasons on game birds were established, and the catching of trout by any means other than hook and line was forbidden. Yellowstone National Park was the first and largest area to be declared a national park by the Federal Government. It was established in 1872 to preserve for all time the natural wonders of this area. In 1891 another million acres of forest land bordering on Yellowstone became the first

Federal timber reserve in the country. Today, no large forest tracts in the state are in private hands.

The Wyoming Game and Fish Commission co-operates with the United States Forest Service to protect wildlife. Ten state and four Federal hatcheries stock the mountain rivers and streams with fish. Eighteen game preserves were established in 1939, and game birds are raised on farms as well as in bird sanctuaries. State and Federal agencies protect beaver, and feed the large herds of bison, elk, and deer. The hunting of moose, antelope, and mountain sheep is strictly limited. Only a short open season is allowed for hunting game animals and birds.

People soon realized that too much grazing and plowing of the thin grass cover would destroy the topsoil in such dry country. But important steps to conserve the soil were not taken until the early 1930's. Two large land-use projects, which covered several million acres, were established at Lander and Torrington, under the direction of the Erosion Service of the United States Department of Agriculture. Here farmers may learn methods of reclaiming and conserving lands, range management, wood-lot control, crop rotation, and methods of wildlife protection.

The United States Bureau of Reclamation supervises the conservation and use of water for power and irrigation, and it has built eight storage dams to hold back millions of acre-feet of water. The North Platte Project is the largest of these storage reservoirs, and the waters are used in Nebraska. The waters which are stored at Jackson Lake are for irrigation of land in Idaho. Other important reservoirs include Guernsey Lake, Pilot Butte, Bull Lake, Shoshone, Seminoe, and Alcova. Nearly thirty other reservoirs are owned by the state, and administered by the Commissioner of Public Lands. The power developed at many of these dams not only serves Wyoming, but also is carried by high-power lines into neighboring states.

The People and Their Work

Population: 250,742 (1940), ranking forty-seventh among the states. Density, 2.6 persons per square mile, ranking forty-seventh. *Distribution,* urban, 37.3 per cent; rural, 62.7 per cent. *Largest cities,* Cheyenne (22,474), Casper (17,964), Laramie (10,627), Sheridan (10,529). For population of other cities, see back of colored map.

Chief Products: *Agricultural,* dairy products, cattle, sheep, wool, chickens and eggs, turkeys, honey, oats, wheat, barley, corn, beans, sugar beets, potatoes. *Mineral,* petroleum, natural gas, natural gasoline, coal, iron, copper, silver, gold. *Manufactured,* petroleum refinery products, carbon black, lumber and wood products, newspapers and periodicals, processed meats, leather goods, canned foods, flour, beet sugar.

The People. The Wyoming country was once the hunting grounds of twelve great Indian tribes. These were the Crow, Blackfoot, Sioux, Ute, Bannock, Flathead, Cheyenne, Arapaho, Shoshone, Modoc, Nez Percé, and Kiowa. Warfare killed off many of the Indians, and hundreds of them moved to reservations in other states. About 2,300 descendants of the Shoshone and Arapaho live on the Shoshone Reservation at the foot of the Wind River Mountains.

The Lewis and Clark Expedition did not cross the

Wyoming country, but it awakened interest in the great Northwest, and many trappers and traders came early to Wyoming. The first small white settlements were around the trading posts, Fort Laramie and Fort Bridger. A few Mormons settled in the southwestern corner in the 1850's. Gold and the Union Pacific Railroad brought many settlers in the 1860's and 1870's. Hundreds of Chinese laborers helped build the Union Pacific, and they later settled in the coal-mining regions. The Homestead Acts of 1909 and 1916 brought many settlers to take up land. Many of these settlers were from northern Europe and the British Isles. During the early 1900's, Italians and Greeks came to the mining communities. Swedish and other Scandinavians arrived to work at the logging camps, and Mexicans, Russians, and Germans worked on the sugar-beet farms.

Today, 93.2 per cent of the people are native-born. The largest groups of foreign-born are those from the British Isles, Germany, Sweden, Russia, Italy, and Mexico. There are fewer than a thousand Negroes in the state.

Agriculture is nearly as important as mining in Wyoming. Agricultural activities are divided into three main branches, livestock raising, irrigation farming, and dry farming.

Livestock produces the greatest farm income, and many of the field crops are grown chiefly as feed for animals. The raising of livestock began in the early days of settlement. In the 1870's, the open ranges of Wyoming Territory became a cattlemen's kingdom. Stories of the easy fortunes to be made in cattle soon spread, and the region was swamped by the rush of stock raisers. Wealthy English, Scottish, and German families took up huge holdings of unfenced land. More cattle were herded onto the ranges than could find food, and after an extremely dry summer and a severe winter (1886-1887), the cattle wealth failed. When the big cattlemen came back after a few years, they found that the small

the Big Horn Basin and on the Great Plains. Dairying is centered chiefly in the Mormon community of the Star Valley, along the Idaho border, and the dairy products are marketed through co-operatives. Sheep are raised in the regions around Jackson Hole, in the sagebrush country of the Great Divide Basin, and in many other basins and valleys.

Poultry and eggs are important farm products in the southeast, and turkeys are raised there in great numbers. Damp weather kills young turkeys, and so this dry section is especially suitable for them. Beekeeping is an important occupation in the Green River Basin. Fur farming is a growing industry, and silver fox, mink, white rabbit, and silver badger are raised. Wyoming has two of the few chinchilla fur farms in the United States.

Irrigation Farming is widely carried on in the southeastern, north central, and western parts of the state. About 2,000,000 acres are irrigated in all. The most valuable crop is hay. Sugar beets rank second, and potatoes and beans are grown in great quantities.

Dry Farming was introduced into Wyoming around 1878, by Swedish settlers, who proved that by letting the land lie uncultivated every other year, the rainfall of two years could be used to grow one year's crops. Dry farming is carried on chiefly in the Great Plains region, and the chief crops are wheat, oats, corn, barley, and potatoes. The certified seed potatoes which are grown here are unusually free from rot and scale, and are shipped to many other states for planting. Some of the lands have been turned back to grazing where dry farming has been unsuccessful. But improved methods introduced by the United States Bureau of Reclamation are restoring much of the region to cultivation.

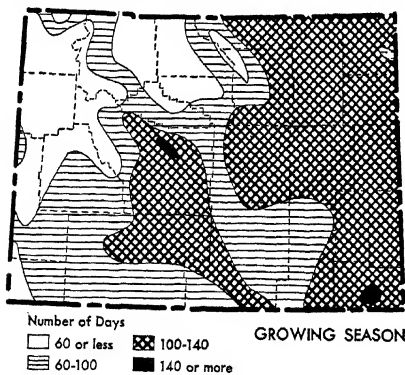
Fruits are grown in sections where the irrigation is sufficient, but the crop is uncertain, because late frosts which kill the blossoms are common. Apples are raised in the Lander, Sheridan, and North Platte valleys, and cherries are grown around Egbert.

Minerals. The development of Wyoming's great mineral wealth has been held back because it is so difficult to build good highways and railroads through the mountainous regions. But the great reserves of coal, iron, oil, natural gas, and many other minerals promise a rich field for future development.

Petroleum which oozed from the ground was used for a long time by the Indians as an ointment. The first oil well in Wyoming was not drilled until 1889, and for more than twenty years, the petroleum industry grew slowly. When World War I began, there was an increased need for gasoline and oil, and the Wyoming fields boomed.

Today, oil produces more wealth than any other mineral resource within the state. Four out of every five barrels come from the Lance Creek, Salt Creek, and Oregon Basin fields. Wyoming ranks about ninth among the oil-producing states. Natural gas is another important mineral product. The principal wells are in the oil fields around Casper, and in the coal region around Rock Springs.

Coal of a good grade of bituminous or soft coal is found in every county of Wyoming except one. About five million tons are mined a year. Rich coal deposits

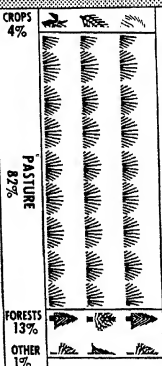


homesteader had come into Wyoming, and that his fences cut up the free range for their cattle. From 1889 to 1892, open warfare increased between the big cattlemen's organizations and the settlers. Finally, Federal troops had to be sent to the region. Federal and state ownership of the ranges, with grazing rights rented to ranchers, did much to bring about more friendly feelings.

The most important beef-cattle ranches are found in

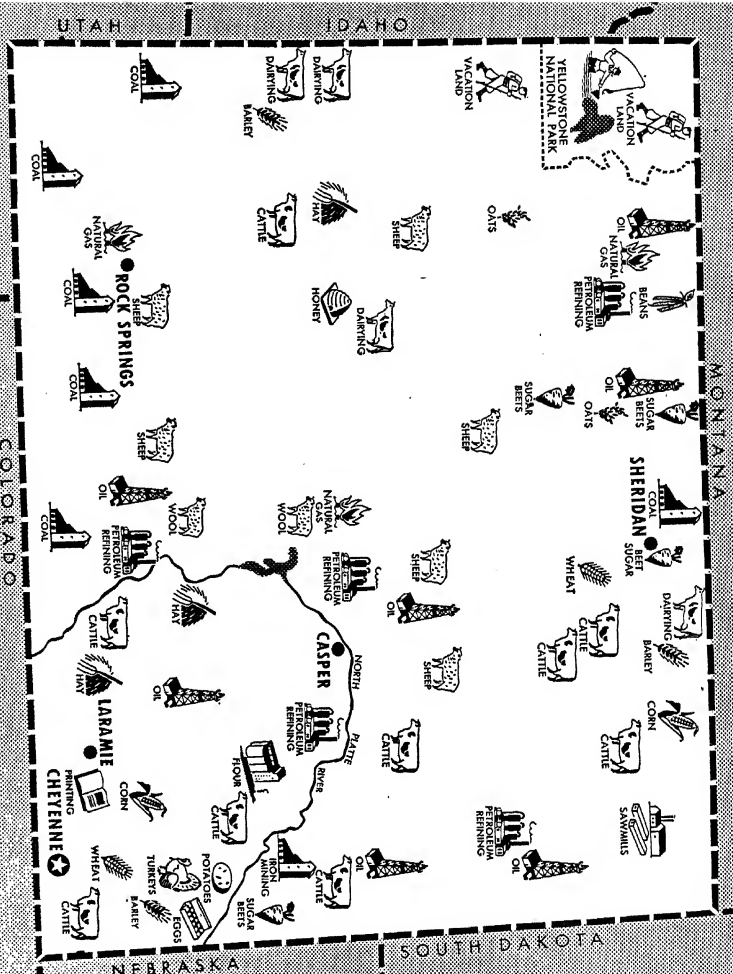
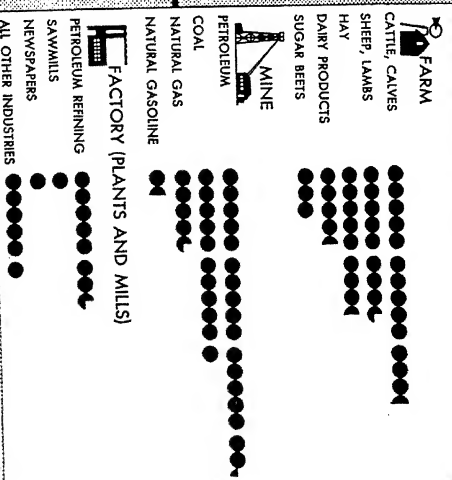
WYOMING

LAND USE



AVERAGE YEARLY VALUE OF LEADING PRODUCTS

EACH DISK REPRESENTS ONE MILLION DOLLARS
DISKS REPRESENTING FACTORY PRODUCTS INDICATE VALUE ADDED TO MATERIALS IN THE FACTORY



LEADING PRODUCTS AND INDUSTRIES

SOME PRODUCTS ARE OF STATE-WIDE IMPORTANCE
THE SYMBOLS ON THE MAP INDICATE LEADING AREAS ONLY

Based on latest U.S. Government statistics; prepared for the exclusive use of the
WORLD BOOK-ENCICLOPEDIA by Fitzgibbon Corporation

were discovered as early as 1850, and the Union Pacific Railroad opened the first mines in the southern section of the state during the 1860's. The largest producing mines are in the south around Rock Springs, Superior, and Hanna. Sheridan, which is the largest town in northern Wyoming, is the center of another rich coal field. It is figured that the soft-coal reserves in Wyoming are among the largest in the United States.

Iron ore is taken from several mines on the south-eastern slopes of the Laramie Mountains. These deposits were worked as early as 1899. The state produces more iron ore than all the other Rocky Mountain states put together. The greatest production comes from one enormous open-pit mine, called "the Glory Hole," at Hartsville.

Gold was discovered in 1842 in the South Pass district of the Wind River Mountains. The discovery of a new gold vein in 1867 brought a rush of miners to the Sweetwater Valley. Many millions of dollars worth of gold were produced in the early years, but now the output is worth only a few thousand dollars a year. Most of the gold comes from the Centennial and Albany districts of the Medicine Bow Mountains, where a new deposit was found in 1937.

Other Minerals. Bentonite clay is dug in Natrona County and used in papermaking. Potash and oil shale come from Sweetwater and Carbon counties, and asbestos rock and soda are produced in Natrona County. Laramie, Rawlins, and Islay have quarries of fine building rock and limestone. There is huge wealth in bauxite, phosphates, and other mineral deposits which have not yet been developed. Small amounts of silver are mined.

Lumbering. Lodgepole pine makes up the largest quantity of lumber cut. It is taken chiefly from the forests of the Big Horn Mountains. The Black Hills produce yellow pine, and Douglas fir and Rocky Mountain white pine grow on the Medicine Bow slopes. The forests are mainly under Federal and state ownership. The timber stands are cut under the supervision of the United States Forest Service on a sustained-yield basis. This means that new trees are planted as older trees are cut.

Manufacturing. The leading manufacturing industry in Wyoming is the refining of petroleum, at Casper, Sinclair, Glenrock, Greybull, Cody, and Laramie. Second in importance is beet-sugar refining, centered in the beet-growing area. Other important industries of Wyoming include the slaughtering and packing of meats, flour milling, cheese making, and the canning of milk. Cement is manufactured near the limestone quarries. Railroad repair shops are centered at Cheyenne, Laramie, and Green River. One of the largest transport airplane maintenance shops in the country is at Cheyenne.

Transportation. Wyoming has been important in transcontinental travel and communication since the period from 1840 to 1870, when hundreds of thousands of settlers passed through the region on the Oregon Trail, bound for Oregon, California, or Utah. The Pony Express followed in 1860 and 1861. The state now has twenty-five main highways. Thirteen of them join with Federal cross-country routes. The production of oil on

state-owned lands provides money for keeping up more than 3,000 miles of hard-surfaced roads.

The Union Pacific Railroad, which joined the East to the West, was built across Wyoming in 1867 and 1868. Every foot of the line had to be protected by military soldiers, and each worker was armed and trained to fight the Indians who threatened them, killed the men, and stole their equipment. The Union Pacific was the only railroad across the state until 1886, when a line was built from Denver to Cheyenne to join a branch of the Chicago and North Western. Today, there are about 2,000 miles of railroads in the state. Wyoming also has about thirty airports and landing fields.

Press and Radio. The first newspaper in Wyoming was the Fort Bridger *Daily Telegraph*, which was established in 1863. One of the most important early newspapers was the *Laramie Boomerang*, now the *Laramie Republican-Leader*. It was founded in 1881 by Edgar Wilson (Bill) Nye, famous throughout the world as a humorist. Papers that have state-wide circulation today include the *Wyoming Eagle* and *Wyoming State Tribune and State Leader*, both at Cheyenne.

The most important radio broadcasting stations in Wyoming are located at Sheridan, Casper, Cheyenne, and Rock Springs.

Social and Cultural Achievements

Educational Institution: University of Wyoming, at Laramie.

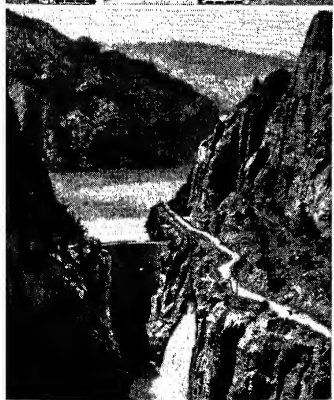
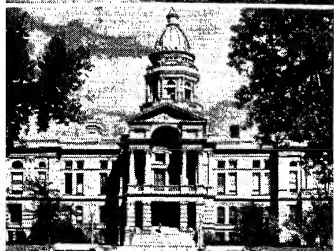
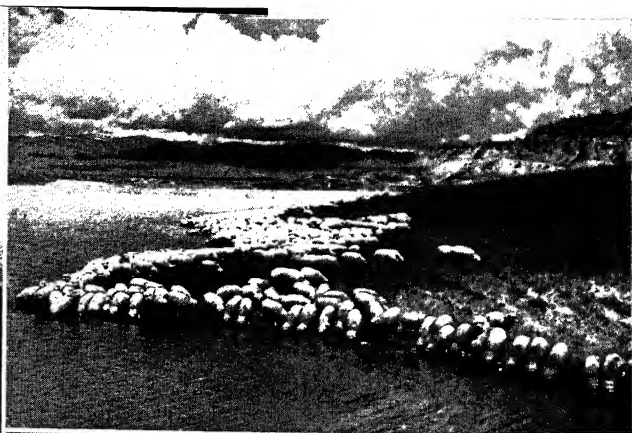
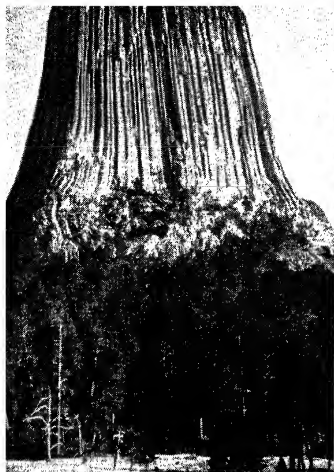
State Welfare, Correctional, and Penal Institutions: *Children*, Children's Home at Casper; *Girl's School* at Sheridan. *Physically handicapped*, Training School at Lander, General Hospital at Rock Springs, Tuberculosis Sanatorium at Basin. *State Hospital* (mentally ill), at Evanston. *Prisons*, Penitentiary at Rawlins; Prison Farm at Riverton; Industrial Institute (for boys) at Worland. *Soldiers' and Sailors' Home* at Buffalo.

Education. The first school in Wyoming was established at Fort Laramie by the post chaplain, William Vaux, in 1852. In 1869 the territorial legislature passed a law providing tax support for schools. Children in remote districts at first were taught in the ranch houses, until many small district schools sprang up throughout the mining and farming communities. A high school was opened in 1875 at Cheyenne, and another at Buffalo in 1881.

The present-day school system is the result of years of effort to overcome the difficulties of providing education for a population that was scattered over vast distances. The schools are supported through money earned on state-owned coal and oil lands, which give Wyoming a large permanent school fund. Children in remote districts are provided with transportation to school, and if the distance is so great that they must live away from home, their living expenses are paid by the school fund. Consolidation of rural schools has gone forward rapidly.

The success of the state educational system is shown by the fact that Wyoming has one of the highest percentages of persons who can read and write in the United States. The Selective Service Commission reported to Congress in 1943 that not one of a million men turned down for military service because they could not read or write was from Wyoming.

The school system is headed by the state superin-



HEART OF THE OLD WEST

Top left: Devils Tower, a natural rock formation of volcanic origin in the Black Hills country, rising 1,200 feet above the Belle Fourche River. *Second left:* The state Capitol at Cheyenne. *Third left:* The Shoshone Dam, in a narrow canyon of the Shoshone River, is 325 feet high and backs up the river for a distance of ten miles. *Top right:* A water hole used by sheep in the high mountain grazing grounds of Wyoming. *Above:* A typical cow outfit leaving ranch headquarters to brand calves during the spring roundup. *Below left:* A ski run in the Jackson Hole country. *Below right:* A horse-riding contest at the Cheyenne rodeo.

Photos: U. & U.; Sowers; C.R. & O. R.R. Co; Balden; Severin, Black Star



tendent of public instruction, who is elected for four years. He appoints the other six members of the State Department of Public Instruction. The department establishes standards, suggests courses of study, supervises the certification of teachers, and assists with school budgets. The Department's division of vocational education does important work in agricultural education among farm children.

The University of Wyoming is discussed under its own name in *THE WORLD BOOK ENCYCLOPEDIA*.

Libraries. The Wyoming Territorial Library was established at Cheyenne in 1871. It is now the State Library. In 1872 the Cheyenne Library Association was organized, and its collection of books formed the beginning of the present Laramie County Free Public Library. A law was passed in 1886 which provided for county libraries supported by taxation.

Today, there are twenty-three library systems in the state, which serve 99 per cent of the people. The University of Wyoming Library contains two important collections, the Robert Frost Library of Poetry, and the Grace Raymond Hebard Room, which contains rare old manuscripts, maps, and historic photographs of the Wyoming country.

Arts and Crafts. Wyoming's natural grandeur was recognized as a subject for landscape painting as early as 1871. In that year Thomas Moran, an artist who accompanied the United States Geological Survey to the Yellowstone region, painted "The Grand Canyon of the Yellowstone." E. W. Gollings, the "cowboy artist," kept a studio at Sheridan from 1909 until his death in 1932. He won world fame for his work. Hans Kleiber, a forest ranger who taught himself the art of etching, won national recognition for his studies of animals. The Wyoming Artists' Association and various other art groups encourage interest in art.

When the cattle country became wealthy, it became the custom to decorate saddles, belts, boots, hats, chaps, and spurs with leather tooling and ornaments. The cowboys have long since given up such fancy gear for simpler and more practical clothing, but these fancy costumes of bygone days were one of the few national types of dress which originated in America. Many shops in Wyoming towns display cowboy ornaments and other handicraft products.

Many fiction writers have written stories based on the romance of the Wyoming country. Washington Irving rewrote the notes and diaries of early explorers. Edgar Wilson (Bill) Nye, the humorist, who lived in Wyoming territory from 1876 to 1883, wrote a number of books based on his experiences at Laramie. Owen Wister's *The Virginian* presented a popular picture of a romantic period in American life. Others who have written about Wyoming include Emerson Hough, Charles King, Zane Grey, Mary O'Hara, and Mary Roberts Rinehart.

The ballads sung by the cowboys as they rode the lonely range have become the songs of all America. In many a cowboy song, Wyoming is named as the land of rich pasture for the cattle herded up from Texas. Musical organizations in Wyoming include the Cheyenne Little Symphony and the Casper Philharmonic Orchestra.

Religion. Missionaries came to the Wyoming country with the fur trappers and traders. Samuel Parker, a Protestant minister, preached a sermon at the yearly assembly of the fur trappers at the V Bar V Ranch, near Bondurant in 1835. The earliest known Catholic service in the region was a high Mass celebrated by Father Pierre Jean de Smet in 1840 on La Prairie de la Messe. Mass is celebrated here every year in honor of this event, and a granite altar was erected to mark the spot in 1925. The Church of Jesus Christ of Latter-Day Saints (Mormon) was established in Wyoming as early as 1847. The settlers who came from the East during the late 1800's and early 1900's established many other religions in the state.

Churches which have the largest memberships today are, in order of numbers, the Roman Catholic, Mormon, Methodist, Episcopal, Baptist, and Presbyterian. There are several beautiful churches in the state, especially St. Mary's Cathedral, at Cheyenne, which is built of native sandstone. The Church of the Transfiguration is a one-room log building which has a window over the altar that frames an inspiring view of the Teton Mountains. It is located between Jackson and Moran.

Social Welfare. Wyoming has taken several progressive steps to promote the welfare of the people. Particular interest is devoted to assisting handicapped children. County commissions have had the responsibility of caring for the needy since 1876. In 1915 these officials were allowed to grant mothers' pensions. The State Department of Public Welfare was made responsible for welfare activities in 1935. The public health service was enlarged remarkably in 1939 and 1940. Among the officials who have the responsibility for health activities are a director of dental health and a specialist to investigate and assist in the control of epidemics. A section for treating crippled children is maintained at the hospital in Casper. A state division of health education was created in 1940. Public health nurses serve twelve rural counties.

Progressive social laws include the Workmen's Compensation Act, an old-age pension law, and an unemployment compensation measure. A child-labor commission supervises and limits the employment of children. The wages and hours of women, persons employed on public works, and miners are established by law.

Recreation and Outdoors

Since Indian times Wyoming has been the land of big-game hunting. Deer, antelope, moose, elk, mountain sheep, and grizzly and black bears are still hunted today in open season. Wild geese and ducks are hunted in autumn on the mountain lakes. Fishing is permitted in the national parks and forests, and also in many thousands of miles of streams controlled by the state foresters. Dude ranches attract many vacationists. The people of Wyoming join hundreds of thousands of visitors in enjoying the wonders of Yellowstone National Park, Grand Teton National Park, the Jackson Hole country, the Wind River region, the Big Horn Mountains, the Snowy Range, and the Absaroka Range. Skiing is a popular winter sport in mountains.

The Saturday night dance has long been a part of

Wyoming social life. People come from miles to the ranch houses for dancing. They bring the children to sleep for the night, contribute food for the midnight lunch, and often dance till dawn.

State and National Parks and Forests include most of the forest and mountain lands of Wyoming. Among the national forests are Bighorn (1,121,541 acres), Bridger (1,710,220 acres), Medicine Bow (1,398,288 acres), Shoshone (1,592,381 acres), Teton (1,832,622 acres), and Washakie (866,263 acres). Wyoming shares several national forests with other states. Ashley (29,930 acres) and Wasatch (16,873 acres) are partly in Utah; Black Hills (194,558 acres) and Harney (3,676 acres) are shared with South Dakota; and Caribou (7,273 acres) and Targhee (344,573 acres) are partly in Idaho. The state has also set aside parks, including:

Fort Bridger, near Evanston. The fort was built in 1842 by Jim Bridger, and was one of the important stopping points on the Oregon Trail. Some of the houses are still well preserved. The old trader's store contains a museum of pioneer relics.

Hot Springs (6,200 acres), near Thermopolis. Contains Big Horn Spring, one of the largest hot springs in the world. It is twenty-five feet across and pours out 18,600,000 gallons of water at 135° F. every twenty-four hours. A suspension bridge gives a view of the falls, where the spring waters join the Big Horn River. Several smaller hot springs bubble up through the cooler water of the river.

Other Interesting Places to Visit in Wyoming are:

Buffalo Bill Museum, Cody. Here are saddles, boots, spurs, pistols, blankets, and many other personal belongings of the famous Pony Express rider who later became one of the great showmen of his day.

Fossil Fish Cliff, Fossil. Fossilized remains of creatures who lived in and about a great inland lake 50,000,000 years ago.

Glory Hole of Sunrise Mines, Sunrise. One of the largest open-pit iron mines in the country. Between 500,000 and 800,000 tons of the ore are shipped each year, yet immense reserves still remain.

Hell's Half Acre, near Casper. A 320-acre canyon on the Powder River in the middle of a flat wilderness. Unusual shapes have been carved in the sandstone and shale by blown sand and rain. Many fossils of plants and animals are found here.

Medicine Wheel, near Sheridan. Prehistoric Indian shrine, 245 feet around, built of limestone slabs and boulders. Apparently it represents the sun, with six mounds of rocks around the wheel to stand for planets.

Government

National: Electoral votes, 3. Representative in Congress, 1.

State: Senators, 27; representatives, 56. *Capital*, Cheyenne.

Counties: 23.

Wyoming is governed under the state constitution adopted in 1890, when the state was admitted to the Union. It is the only state constitution which has granted both men and women the right to vote from the beginning of statehood. A direct primary law for election of state officers was adopted in 1911.

Executive officers include the governor, secretary of state, auditor, treasurer, and superintendent of public instruction, all elected for four years. These officials, except for the auditor, make up a board of land commissioners which has charge of public lands.

Legislative power is vested in a senate and a house

of representatives. The senators serve for four years, and the representatives for two. Half of the members of the senate are chosen at each election. Lawyers are hired by the legislature to draw up bills. Sessions are usually not longer than 40 days. The legislature meets in January of odd-numbered years.

Judicial decisions are made by a system of courts headed by a supreme court which is made up of a chief justice and two associate justices, elected for eight years. Judges of the six district courts are elected for six years. Minor cases are brought before justice of the peace courts.

Local Government is administered with the county as a unit. Most of the cities are governed by a mayor and council. Sheridan and Cheyenne have had the commission type of government since 1913.

National Politics. From 1900 to 1944, Wyoming has voted seven times for Republican candidates in presidential elections, and five times for Democrats. The state has always voted for the winner except in the 1944 election. See **POLITICAL PARTY** (chart).

Famous Men and Women

Several well-known persons, born in Wyoming or doing their most important work there, are given separate biographies (see *Biographies*, in the list of *Related Subjects* at the end of this article). Others who have won state, national, or international fame include:

Arnold, Thurman W. (1891-), born at Laramie. He was Assistant Attorney General of the United States from 1938 to 1943, and became one of the leaders in investigating monopolies in many fields. Served as mayor of Laramie from 1923 to 1924, and on the law staff of the University of Wyoming from 1921 to 1926. Taught at the law school of Yale University from 1931 to 1937. Author of *The Folklore of Capitalism* (1931).

Baker, James (1818-1898), born at Belleville, Ill. Famous trapper, Indian fighter, and scout. At the age of nineteen, he joined Jim Bridger's company of fur trappers. He was chief scout for General W. S. Harney at Fort Laramie from 1844 to 1845.

Hebard, Grace Raymond (1861-1936), born at Clinton, Iowa. Author of fourteen books on Wyoming history. Her writings include *Sagajawea, a Guide and Interpreter of the Lewis and Clark Expedition* (1933), the result of thirty years research into the life of the Indian "boat woman" who piloted the explorers across the continent. Doctor Hebard served the University of Wyoming for more than forty years, as librarian from 1891 to 1919 and as professor of political economy from 1906 to 1935.

Van Devanter, Willis (1859-1941), born at Marion, Ind. He began his public career at the age of 25, in a campaign against cattle thieves and other outlaws of Wyoming. At the age of 30, he was the chief justice of the territorial supreme court. He helped draw up the constitution of Wyoming, and served as associate justice of the United States Supreme Court from 1910 to 1937.

Warren, Francis E. (1844-1929), born at Hinsdale, Mass. He was sometimes called the "Father of Reclamation" because of his pioneer work in irrigation; leader in sheep farming. He was the last territorial governor and the first state governor, but quit as state governor after a short period to enter the United States Senate. He was re-elected to the Senate in 1894, and served in that post until his death.

State Symbols and Events

State Seal. The woman in the center holds a banner on which is written "Equal Rights." The two men stand

for agriculture and mining.

State Flag. A blue field with a white border and an outer red border. In the center of the blue field stands a white buffalo with the state seal (see right) on its side. See FLAG (color plate, Flags of the States).

State Motto. *Cedant Armæ Toga* (Let arms yield to the gown).

State Bird. Meadow lark. See BIRD (color plate, Birds That Help the Farmer).

State Flower. Indian paintbrush. See FLOWER (color plate, Mountain Flowers).

State Tree. None.

State Song. Unofficial but popular is "Wyoming," words by Charles E. Winter of Casper, music by G. E. Knapp of Laramie and Mrs. Harold Vaughan of Cheyenne.

Annual State Events. Among the many interesting events on the state calendar are:

William F. Cody Day, at Cody, February 26.

Old Settlers' Picnic, at Devils Tower (state-wide), third Sunday in June.

Chuck Wagon Days, at Big Piney, in June (no fixed date); rodeo, stockmen's meeting, and barbecue.

Cody Stampede, at Cody, July 2 to 4.

Equality Jubilee, at Laramie, July 10 and 11.

Frontier Days, at Cheyenne, fourth week in July.

Shoshone Sun Dance, at Fort Washakie, in July (no fixed date).

Jackson Hole Rodeo, at Jackson, August 9 to 11.

Wyoming-on-Parade, at Casper, third week in August.

Wyoming State Fair, at Douglas, second week in September.

Wyoming Day, anniversary of woman's suffrage, state-wide, December 10.

Winter Carnivals, at Afton and Jackson, in December (no fixed dates).

History

1743 Vérendrye may have sighted the Big Horn Mountains.

1807 John Colter discovered the Yellowstone region.

1812 Robert Stuart crossed Wyoming from west to east.

1822 General William Ashley established a trading post on Yellowstone River, and hired Jim Bridger as scout.

1824 Thomas Fitzpatrick and Jedediah Smith passed through South Pass, discovering a shorter route to the east.

1832 Captain B. L. E. Bonneville discovered oil in Wyoming.

1834 Fort William (later Fort Laramie) built.

1843 Fort Bridger established on Oregon Trail.

1868 Wyoming Territory established.

1869 Women granted the right to vote.

1872 Yellowstone became first national park.

1889 First oil well drilled in Shannon Field. State constitution adopted.

1890 Wyoming admitted to the Union as the forty-fourth state.

1909 Pathfinder Dam completed.

1910 Shoshone Dam (now Buffalo Bill Dam) completed.

1924 Nellie Tayloe Ross became first woman governor in the United States.

1929 Grand Teton National Park established.

1938 Alcova Dam completed.

1940 Seminole Dam completed.

1941 Wyoming's resources organized for war.

1943 Tests begun to make use of undeveloped iron ore resources.

1945 Wyoming returns to peacetime production.

Indian Days. The twelve tribes of Indians who once



hunted in the Wyoming country bitterly hated the white men who came to hunt and trap, and, finally, to establish their homes. The Shoshone Indians were friends of the settlers for a time, but later they became fierce enemies, and joined the other tribes in attacks on wagon trains, trading posts, telegraph stations, and railroad workers.

Exploration and Settlement. Probably the first white man to enter the territory that is now Wyoming was the Chevalier de la Vérendrye. He was a French fur trader and explorer, who passed through the region in 1743. In 1807 John Colter, an American trader, discovered the Yellowstone region. It soon became a meeting place of the early trappers, and is described in Washington Irving's story, *Captain Bonneville*. The hero of this story was one of the traders and the first man to cross the Rocky Mountains with wagons.

That section of the present state which lies east of the Rockies was a part of the Louisiana Purchase in 1803. It was included in the Territory of Missouri in 1812, and in the "Indian Country," organized in 1834. Later, that section was part of the territories of Nebraska and Dakota. No permanent settlement was made until 1834. In that year, Fort William, later called Fort Laramie, was established as a trading post. In 1842 John Frémont explored the Wind River Mountains and South Pass, under the guidance of Kit Carson, famous frontier guide and scout. Frémont was working for the United States Government. In 1846 Congress voted funds to establish military posts along the route to Oregon to protect travelers from raiding Indians. Fort Laramie was bought by the United States Government in 1849, and remained an active military post until 1890. The region west of the mountains was included first in the Oregon country and then in the territories of Oregon and Washington. That part of the state south of the forty-second parallel belonged to Spain, then to Mexico, and lastly to the Republic of Texas before it became part of the United States. In 1863 the government again was changed, when what is now Wyoming, except for a small section in the southwest, was given to Idaho territory.

The streams of immigration to California and Oregon passed through Wyoming mainly over the Oregon Trail along the North Platte and Sweetwater rivers. But few of the pioneers settled in the state. The Northern Sioux and Cheyenne Indians who held much of the region were bitter toward white settlement, and they continued their attacks until after the close of the Sioux War in 1876.

It was thought that gold might be found in Wyoming, and exploring parties set out as early as 1863. Profitable quantities of gold and silver were not found until 1867, when a strike was made in the Sweetwater region. The gold discoveries were not exciting, but settlements sprang up. Among them was South Pass. In 1867 the Union Pacific extended its line to Cheyenne, and laid out the town before the railroad was built. Settlers followed the railroad, but most of the towns they built disappeared almost as quickly as they appeared.

The wild, picturesque life of old Cheyenne has been captured forever in the writings of Bret Harte and Mark Twain. Fortunately for the town, the railway

soon advanced to Laramie City, and most of the lawless characters wandered on to the new settlement. The lawlessness of this unorganized country, and the constant increase of settlers, proved that the territory needed some authority and order. In 1865 the settlers had sent petitions to Congress asking for territorial organization of this region, but no action was taken. In 1868 Wyoming was organized as a territory with its present boundaries, and in 1890 it was admitted to the Union.

Progress as a State. The quarrel between the cattlemen, who wanted the ranges of Wyoming kept free and open for their herds, and the farmers, called "nesters," who tried to fence in the best lands, had long been threatening. It broke out into violence in what has been called the Johnson County Cattle War. The farmers joined with the rustlers, or cattle thieves, who operated in the region, and several men on both sides of the quarrel were shot or hanged by lynching mobs. In the spring of 1892 the cattlemen of Johnson County formed a military group called the Regulators. Their plan was to kill the known rustlers and drive the farmers out of Wyoming. The rustlers and farmers were warned of the coming attack and quickly formed an army. Before the two forces could meet, Federal troops arrested the entire body of Regulators. Soldiers were stationed at Buffalo, which was called the "rustlers' capital," until tempers had cooled, and ill feeling died down.

The Homestead Acts of 1909 and 1916 opened new land and provided that a settler should receive title to a tract of land after living on it for three years. These acts brought hundreds of newcomers to Wyoming. The big herds of cattle and flocks of sheep became smaller as fences were strung over more and more of the range. As irrigation increased, greater attention was given to intensive farming, to winter feeding of cattle, and to dairying and poultry raising.

During World War I, Wyoming sent 11,393 men, which amounted to 7 per cent of its population, into the armed forces. The Kendrick Dam and power plant on the North Platte River, completed in 1940, provided power in central and southeastern Wyoming. World War II brought growth in the production of mine, farm, and factory. In mineral deposits, forests, and facilities for manufacturing, Wyoming has great resources which can be developed as the state undergoes further technological progress. T.A.L.

Related Subjects. The reader is also referred to:

BIOGRAPHIES

Carson, "Kit," Christopher	Laramie, Jacques
Cody, William Frederick	Nye, Edgar Wilson
Colter, John	Ross, Nellie Tayloe
Frémont, John Charles	

CHIEF PRODUCTS

Bean	Honey	Sugar Beet
Cattle	Lumber	Wool
Coal	Petroleum	
Hay	Sheep	

CITIES

Casper	Laramie
Cheyenne	Sheridan

COLLEGES AND UNIVERSITIES

Wyoming, University of

HISTORY

Homestead Law
Indian, American

Pony Express
Trails of Early Days

PHYSICAL FEATURES

Big Horn River
Black Hills
Rocky Mountains

Teton Range
Yellowstone River

UNCLASSIFIED

Cowboy
Dry Farming
Food (Famous Foods of the States)
Grand Teton National Park
National Forests
Ranching
Rodeo

Seminole Dam
Shoshone Dam
United States of America (color plates, Majestic Mountain Peaks [Mount Moran]; Scenic National Parks and Playgrounds [Teton Mountains])
Yellowstone National Park

Books for Younger Readers

BORLAND, HAROLD G. *Wapiti Petr.* Farrar, 1938. A story of an elk of the Wyoming mountains.
DAVID, ROBERT BEEBE, ed. *Wyoming Speaks in Pictures.* Prairie, 1938. Beautiful scenery illustrated.
GAGE, JACK R. *Geography of Wyoming; a Textbook in Geography for the 5th-8th Grades.* Mills Co., Sheridan, Wyo., 1940.
GARST, DORIS SHANNON. *Story of Wyoming, and its Constitution and Government.* The author, Douglas, Wyo., 1938.
RICHARDSON, MYRA REED. *Sheep Wagon Family.* McBride, 1941. Struggles of a homestead family in the Wyoming territory.
SCHMIDT, SARAH LINDSAY. *New Land.* McBride, 1933. Farm and school life.
STEVENS, ELIZABETH WELTY. *Ann of Bar Ton Ranch.* Knopf, 1938. A girl's adventures in the new state of Wyoming.

Books for Older Readers

BURT, MAXWELL STRÜTHERS. *Powder River.* Farrar, 1938. (Rivers of America series.) History of the section of Wyoming drained by Powder River.
CHAFFIN, LORAH B. *Sons of the West.* Caxton, 1941. A history of the state told in anecdote form.
HOUGH, DONALD. *Snow Above Town.* Norton, 1943. Sketches of a remote village in the Grand Teton Mountains.
O'HARA, MARY. *Green Grass of Wyoming.* Lippincott, 1946. Novel of ranch life in Wyoming. Continues the stories begun in *My Friend Flicka*. 1941. *Thunderhead*. 1943. Stories of raising blooded horses on a Wyoming ranch.
WELCH, CHARLES A. *History of the Big Horn Basin; with stories of Early Days, Sketches of Pioneers and Writings of the Author.* Deseret, 1940.
Wyoming; a Guide to Its History, Highways and People. Oxford, 1941. (American Guide series.) Wyoming past and present.

An Outline suitable for Wyoming will be found with the article "State."

Questions

Why is Wyoming called the Equality State?

What provision in the Wyoming constitution made it different from the original constitution of any other state in the Union?

Where in Wyoming is the first area in the United States to have been set aside as a national park? Who is thought to have been the first white man to visit the area?

What historic pioneer trail crossed Wyoming? Which railroad later followed it part of the way?

In what way did the following play an important part in the history of the state: Jim Bridger, Kit Carson, Father De Smet?

Why is the "Glory Hole" so important to the people of Wyoming?

What caused the Johnson County Cattle War?

What famous writers were inspired by the great Wyoming cattle empire? Who wrote about the picturesque life of old Cheyenne?

What is unusual about the streams of the Great Divide Basin?

Why is southeastern Wyoming especially suited to the raising of turkeys?

WYOMING, UNIVERSITY OF, is a state-controlled coeducational school at Laramie, Wyo. It has colleges of agriculture, education, engineering, law, and liberal arts. The university also includes divisions of commerce, home economics, and music. The university was founded in 1884, and has an average enrollment of about 2,300.

WYOMING VALLEY is a section of Luzerne County, Pa., occupying an area three miles wide and twenty miles long on the north bank of the Susquehanna River. The valley is the center of a rich anthracite region and the location of the industrial city of Wilkes-Barre.

The Pennamite-Yankee War was fought between colonists of Connecticut and Pennsylvania for possession of the Wyoming Valley in the 1770's, and the dispute was not settled until 1800. The valley was also the scene of one of the worst massacres of the American Revolution in 1778, when about 200 persons were killed at Forty Fort by a large band of Tories and Indians. L.D., Jr.

See also **WYOMING VALLEY MASSACRE**.

WYOMING VALLEY MASSACRE. Beautiful Wyoming Valley was the scene of one of the many tragedies of the American Revolutionary War. The valley lies in what is now Luzerne County, Pennsylvania. In 1778 it was an incorporated county in the colony of Connecticut. At that time, most of the inhabitants of the valley believed in the American cause of independence from Great Britain. But some of the residents were Tories who remained loyal to Great Britain.

As the war went on, the Tories were driven out of the community, and joined other Tory and Indian bands. In the summer of 1778 these bands attacked Wyoming Valley. The inhabitants fled for safety to Forty Fort, which was near the site of the present city of Wilkes-Barre, Pa. About 300 men defended the fort. They were opposed by an army of 800 fighters led by a British officer. Six hundred of the attackers were Indians.

On July 3, the two groups met in a hard-fought battle. The settlers were defeated. More than two thirds of them were killed. Many were tortured to death by the Indians. The survivors were left to find their way to the nearest settlements, and many of them died on the way. The attackers laid waste the village and left the lovely valley in ruins.

J.R.A.

WYSS, veez, JOHANN RUDOLF (1781-1830), was a Swiss educator and author. He is remembered chiefly for his story *Swiss Family Robinson*. It tells the adventures of a family which was shipwrecked on a desert island in the Pacific. It is perhaps the best of the many stories which were written in imitation of Daniel Defoe's *Robinson Crusoe*. Wyss heard the story of *Swiss Family Robinson* from his father Johann David Wyss (1743-1818) and wrote it down later.

Wyss was born in Bern, and became a professor of



Milo Winter illustration from *The Swiss Family Robinson* by J. R. Wyss, © 1944 by Rand McNally & Co.

Johann Wyss's *Swiss Family Robinson* is one of the best known of young people's books. Here the family, wearing water-bottle life preservers, rows to safety on an island.

philosophy at the university there. His works include the Swiss national anthem "Rufst du, mein Vaterland?" (Are You Calling, My Fatherland?).

E.W.K.N.

WYTHE, with, GEORGE (1726-1806), was a patriot of the Revolutionary War and a well-known lawyer and judge. He was born at Back River, Va., and studied at William and Mary College. There in 1779 he established the first professorship in law in the United States.

Wythe was admitted to the bar in 1757 and entered the Virginia House of Burgesses a year later. There he at once showed his patriotism and executive ability.

Wythe wrote the first draft of the Virginians' protest against the Stamp Act in 1764. It was so fiery that it had to be rewritten in a softer tone. Wythe attended the Continental Congress in 1775, and signed the Declaration of Independence the next year. Later he helped draft the Virginia constitution.



Chicago Historical Society
George Wythe, American Revolutionary statesman

In 1778 Wythe became a judge of the court of chancery of Virginia, and in 1786 he became chancellor of the state. The next year he helped draft the Constitution of the United States. Wythe died from poison which was given him by his grandnephew.

THE WORLD BOOK ENCYCLOPEDIA



X x is the twenty-fourth letter of our alphabet. It probably came from the letter named *samekh* in the alphabet of the ancient Semites. The Greeks took this letter into their alphabet to represent the sound of *ks*. The Romans used *X* in their alphabet to represent the same sound. In English, *X* has three sounds: *ks* as in

FROM PICTURE TO LETTER



Sinai
1850 B.C.



Phoenician
1200 B.C.



Greek
600 B.C.

Roman
A.D. 114

fix, *gs* as in *exist*, and *z* as in the first *X* of *Xerxes* (*ZURK seez*). See also ALPHABET; PRONUNCIATION, E.F.D.

XANTHIPPE, *zan TIP ee*, or **XANTIPPE**, was the wife of Socrates. She may have been forty years younger than the great philosopher, and some historians say she belonged to the family of Pericles. Later generations believed that she had a poor disposition and a bitter tongue, and that Socrates married her simply to discipline himself and acquire self-control, but there is no proof of this. See also SOCRATES.

C.B.W.

XANTHOPHYLL, *ZAN thoh fil*. See LEAF (Fall Colors).

XAVIER, *ZAV ih er* (in Spanish, *hah VYAIR*), **FRANCIS, SAINT** (1506-1552) was a Jesuit missionary. He is also called "the Apostle of the Indies." Most of his work was done in the Far East.

Saint Francis Xavier was born near Sanguesa, Spain, of a noble family. His name in Spanish was Francisco de Xavier. His study in Paris brought him acquaintance with Ignatius of Loyola, with whom he helped to found the Society of Jesus. He accompanied Ignatius to Italy, doing hospital and missionary work, and was ordained priest in 1537. He remained in Rome as secretary to the Jesuit society until 1540.

Xavier was sent in that year by John III of Portugal to spread Christianity in the Portuguese possessions in India. He landed in Goa, on the Malabar Coast, in 1542. Many converts to the Catholic Church were made by his preaching in Travancore, at Malacca, and in Japan. He planned a mission to China, but died before he could set out upon it. His body lies in a shrine in Goa. Xavier was declared a saint by the Catholic Church in 1622.

Xavier was credited in his own day with possessing the gift of tongues, but he strongly denied it. Many

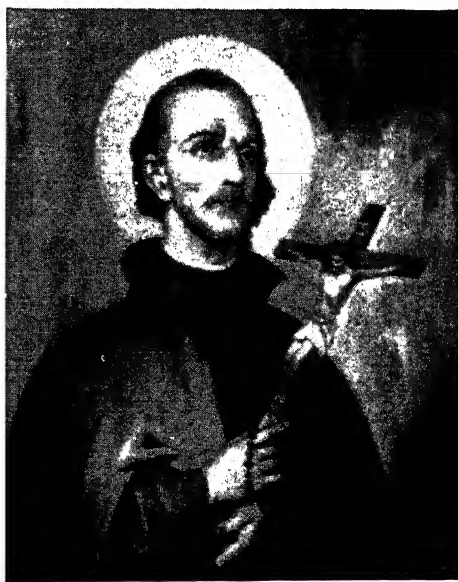
miracles were credited to him. He was one of the greatest missionaries and explorers in the Far East, and his converts numbered hundreds of thousands. Saint Francis Xavier was an efficient organizer and a very capable man. His feast day is December 3.

F.J.S.

See also MISSIONS AND MISSIONARIES.

XAVIER UNIVERSITY is a coeducational school for Negroes at New Orleans, La. It is controlled by the Roman Catholic Church. The University has colleges of liberal arts, pharmacy, and education. It also has a school of social service, and a high-school department. The school was founded in 1918, and has an average enrollment of about 900.

XAVIER UNIVERSITY is a liberal arts school for men at Cincinnati, Ohio. It is controlled by the Roman Catholic Church. The college of liberal arts has divisions at Milford and at Evanston Station, Cincinnati, besides the Downtown College in Cincinnati. There is a department of commerce and finance in the Evanston and Downtown schools. Women are admitted to the Downtown campus and to evening classes. The university accepts credits in music and art from the Cin-



St. Xavier College

St. Francis Xavier, with his friend Ignatius Loyola, founded the Society of Jesus. This order has become one of the most famous Roman Catholic educational groups.



Xenophon Gives Thanks to the Gods as His "Ten Thousand" Finish Their 1,500-Mile Retreat to the Bosphorus

cinnati College of Music and the Cincinnati Art Museum. Xavier University was founded in 1831, and has an average annual enrollment of about 1,500 students.

XENON, *ZĒ nahn* (chemical symbol, Xe), is one of the chemical elements known as the inert, or rare, gases. It has the atomic number 54, and atomic weight 131.3. All the inert gases are colorless and odorless, and make up a very small part of the atmosphere. The xenon in 20,000,000 volumes of air would fill only one volume. Like the other members of its group, this gas has no known reactions with other chemicals. The name *xenon* means *stranger*. The British chemists, Sir William Ramsay and Morris Travers, discovered the element in 1898 by carefully distilling liquid air. Since xenon does not combine with other elements, it is used in some vacuum tubes. See also RAMSAY, WILLIAM, SIR. G.L.B.U.

XENOPHON, *ZĒN oh fahn* (about 434 B.C.-about 355 B.C.), was a Greek soldier and historian. While a man of action, he was noted in his own times as well as at present chiefly as a writer.

Xenophon was born in Athens of a noble family. He studied under Socrates, but was more interested in military subjects than in philosophy. In 401 B.C. he joined a large band of Greek adventurers, led by the Persian prince, Cyrus the Younger. Cyrus wanted to seize the throne of Persia from his brother Artaxerxes. But Cyrus was killed in the Battle of Cunaxa and the Greek commanders were killed soon afterward. The ten thousand adventurers were stranded in a strange country without commanders. They chose Xenophon as their leader and began their long retreat toward home. Xenophon afterward described this 1,500-mile march in his history of the expedition, *Anabasis*.

After months of hardships they reached the Bosphorus. Here they served for a time with a Thessalian king, and then joined a Spartan army in a battle against the Per-

sians. In the last campaign Xenophon captured a wealthy Persian and forced him to pay an enormous ransom. This ransom made Xenophon financially independent for the rest of his life. He then settled in the district of Elis and devoted himself to writing. C.B.W.

See also CYRUS THE YOUNGER; GREEK LITERATURE (Attic Period).

His Works include the *Hellenica*, a history of Greece, and *Memorabilia*, recollections of Socrates. He also wrote essays on hunting and on horsemanship.

XEROPHYTE, *ZĒ roh fite*. See BOTANY (Terms).

XERXES, *ZURK seez*, was the name of two kings of Persia.

Xerxes I (about 519-about 465 B.C.), was the son of Darius I and the grandson of Cyrus the Great. He came to the throne in 485 B.C. His first act was to put down a revolt in Egypt. Afterward he devoted himself to carrying out his father's plan to conquer Greece. Xerxes wanted to avenge his father's defeat at Marathon and to punish the Greeks for their part in the Ionian rebellion. In 483 B.C. he collected the largest army that had ever been assembled. It included half a million men drawn from all parts of his empire. Xerxes then set out with an immense fleet which the Phoenicians had given him. He threw two bridges, formed by a double line of boats, across the Hellespont and cut a canal through the isthmus of Mount Athos Peninsula. In 481 B.C. he ordered his army to cross the Hellespont and to make an invasion of Greece.

Xerxes was victorious at Thermopylae and entered Athens, burning all the houses and temples. But in 480 B.C. his mighty fleet was crushed at the Battle of Salamis. Without ships to bring supplies, the army was helpless, and Xerxes was forced to withdraw. He left a smaller force under Mardonius, and returned to the Hellespont. The following year the Greeks defeated Mardonius' army at Plataea. Xerxes was forced to give up his dream of conquest and spent his last years at Susa surrounded by his harem. His son Artaxerxes I followed him to the throne.

Xerxes II (about 450-424 B.C.), was the son of Arta-

xerxes I. He came to the throne in 424 B.C., after his parents' murder, but ruled for only forty-five days. Sogdianus, his half-brother, murdered him and seized the throne, but Sogdianus was himself murdered soon afterward.

J.W.S.W.

See also AHASUERUS; DARIUS (I); MARATHON; SALAMIS; THERMOPYLAE.

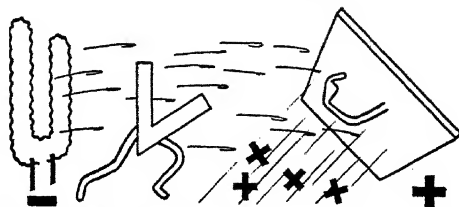
X RAYS. The discovery of X rays was one of the most important events in modern physics, because of the information these rays supply concerning the nature and properties of matter, and their effects upon living tissue. The rays cannot be seen, but they can penetrate the human body, heavy metal castings, or the latticework of atoms inside solids. They leave a record upon a photographic plate of what these substances are like internally. Within the space of only a little more than fifty years, X rays have become invaluable in medicine, in industry, and in scientific research.

X rays were so named by their discoverer, Wilhelm Konrad Roentgen, because they were then rays of unknown origin. An x is used as a scientific symbol for the unknown. In many places, however, X rays are still called *Roentgen rays*, in honor of Roentgen's discovery of them in 1895. In medicine the science of X rays is called *roentgenology*.

X rays are part of the electromagnetic spectrum. This means that they are related to radio waves, heat or infrared rays, visible light waves, ultraviolet and gamma rays, and rays which accompany cosmic radiation. X rays are among the shortest of all these rays. Only the gamma rays (given off by radium and other radioactive material) and radiation associated with cosmic rays are shorter. The wave-length of visible light is in the neighborhood of 5,000 angstrom units, or twenty millionths of an inch. The wave length of ordinary X rays is approximately one angstrom unit, or four billionths of an inch.

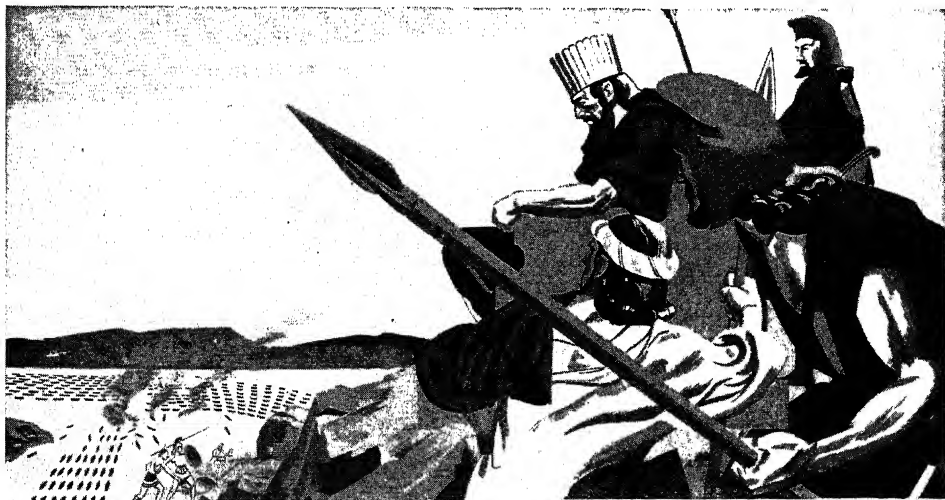
How X Rays Are Produced. When the negative termi-

nal or *cathode* of a vacuum tube is heated by an electric current so that it glows white hot, it gives off a stream



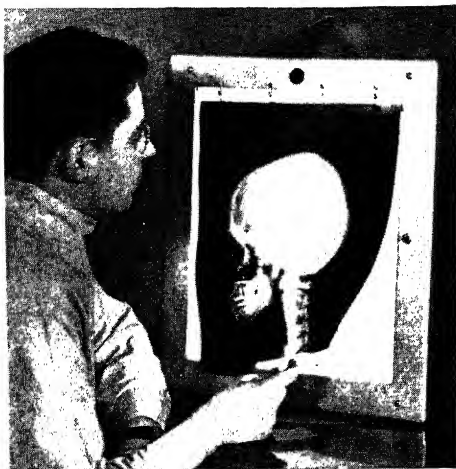
X Rays Are Created when an electric current of very high voltage detaches electrons from the filament of the electronic tube and hurls them against the tungsten plate with great force. The metal atoms in the target give off the radiations called X rays.

of electrons or "cathode rays," which move toward the *anode* or positive electrical terminal of the tube. If these electrons strike the anode, which in an X-ray tube is called the "target" and is ordinarily of metal, they cause the atoms of the target to give off X rays. The target in X-ray tubes is frequently made of tungsten, partly because that metal is not readily melted by the heat resulting from the impact of the electrons upon it. The atoms in the target give off X rays when the electrons inside the atoms are forced out of their normal positions by the energy of the bombarding electrons, and then fall back into place. The electrons displaced from their normal positions in the process of X-ray production lie very close to the center of the atom. It requires more energy to move these electrons than to disturb any others around the atomic nucleus. The higher the electric voltage that is applied to the cathode rays, the shorter the wave lengths of the X rays that are given off, and the closer these X rays will be to gamma rays. That is why in building X-ray machines for some applications, scientists and engineers have attempted to develop very



Xerxes I. Grimly Watching the Defeat of His Fleet at the Battle of Salamis. The Greek ships drove into the heart of the

Persian fleet and wiped it out. Xerxes was enraged, because this defeat meant the end of his plan of conquest.



A Roentgenologist Examines an X-Ray Film. He is a physician who specializes in diagnosis and treatment of disease by X rays.

high-voltage sources and X-ray tubes which will withstand these high voltages. Under such voltages, the electrons that strike the target may almost reach the speed of light.

X rays can be divided into two classes. Scientists speak of *hard* X rays, which are those produced by higher voltages and which are able to penetrate substances much more readily than the *soft* X rays, which are created at lower voltages.

Properties of X Rays. X rays (except for the very softest) are able to penetrate through substances such as human flesh and metals. X rays are also able to affect the chemicals on a photographic plate. This means that "shadow" records can be made of the inside of a human body or a steel casting, for example. Unlike light waves, X rays cannot be readily focused. X rays of a given wave length do not penetrate all substances equally well. Waves produced at 100,000 volts, for example, penetrate the human flesh very readily, but do not penetrate bones so easily. Therefore, a shadow pattern of the bone or other more absorbing tissue may be seen upon an X-ray plate. X rays are also able to affect certain chemicals and make them *fluoresce*. This means that these chemicals will glow brightly as long as the X rays are striking them. This is applied in the *fluoroscope*, which is commonly used in examining the chests of persons for signs of tuberculosis. The fluoroscope shows the pattern made by the X rays which have passed through or been absorbed by various parts of the body. When the X-ray stream has stopped, the fluoroscope ceases to glow.

Even though ordinary 100,000 volt X rays are able to penetrate many different substances readily, they cannot—as light does—pass easily through glass. Softer X rays are even absorbed in air. Lead is very effective in stopping X rays, and lead-containing glass is used on fluoroscope screens and on other parts of X-ray equipment.

X rays also have an effect upon the tissues of living

things. When absorbed, they can destroy or "burn" tissue. Thus ordinary X rays are very dangerous to the human body. Other kinds of X rays are able to affect the genes in the germ cells of living things. In this way heredity itself can be changed.

Uses of X Rays. There are a great many important medical uses of X rays. One of these involves the diagnosis of diseased conditions within the human body. By means of X rays, doctors are able to see the outlines of broken bones—and to set them properly under the fluoroscope; they can detect bullets or other foreign bodies in tissues. In some cases they can observe gall stones or abscesses at the roots of teeth. X-ray fluoroscope machines are widely used in examinations for cases of tuberculosis of the lungs. Pictures of some of the internal organs of the body may be taken by supplementary means. By having the patient drink liquids containing compounds of barium, for example, the doctor is able to take X-ray pictures of the stomach, which may indicate the presence of ulcers or cancer.

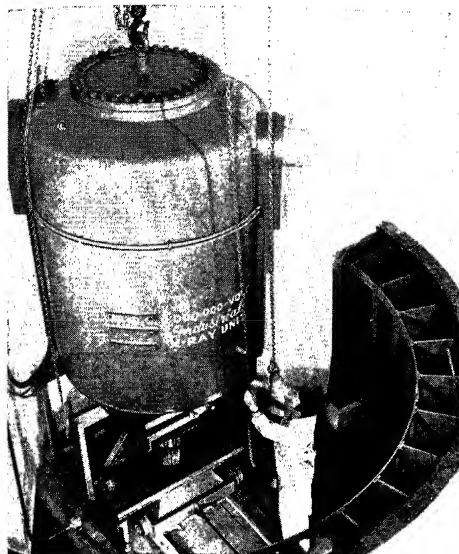
The other important medical use of X rays is in the treatment of cancer itself. Hard X rays kill the newly growing cells that are found in cancers and similar tumors. However, these X rays also have a harmful effect upon the healthy cells near by. For this reason great care must be taken in applying X rays to cancers. Because of these effects of X rays, X-ray equipment is often housed in lead-lined rooms, and workers around the equipment are protected by special garments and by lead or lead-glass shields.

In science, X rays have a wide variety of uses. In a branch of analysis known as *X-ray crystallography* scientists have been able to discover a great many things



General Electric X-Ray Corp.

This Powerful X-Ray Machine is specially constructed for use in the treatment of cancer.



General Electric X-Ray Corp.

One of the Largest X-Ray Machines in use is this two-million-volt giant for testing materials in a large factory.

about the way atoms are arranged in crystals and hence in the molecules of chemical substances. This permits knowledge, for example, of the arrangements of the molecules which are responsible for the fact that rubber stretches, or that oil is a good lubricant. X rays are also valuable in analyzing the chemical content of substances. The way in which the rays are scattered permits the "fingerprinting" of chemicals. A catalog of many thousands of such identifying patterns has been made and is available to industrial scientists. Furthermore, when a beam of X rays is shot through a substance, a delicate measuring device shows how much of the X rays are absorbed. Such measuring devices are so sensitive that they can show the difference in the amount of X rays absorbed between 99 and 100 sheets of paper. This makes it possible for the scientist to know how much of certain materials may be found in the substance. In this way the amount of "ethyl" in gasoline can be measured readily. Or, for another example, scientists use X rays to analyze the pigments in oil paintings, in some cases permitting the identification of the painter. In *X-ray spectroscopy*, X rays are made to yield information concerning the electronic configurations deep inside atoms.

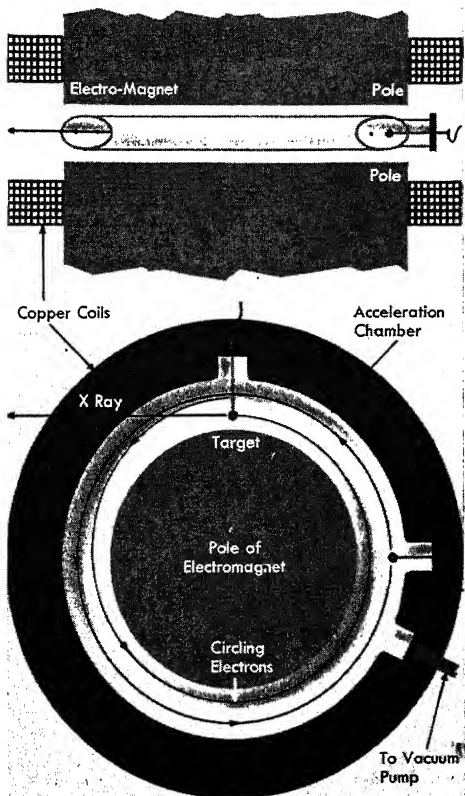
One of the most important developments of X ray in recent scientific research is the development of the *betatron*. This is a device which develops extremely high-speed streams of fast-moving electrons, corresponding to voltages of a hundred million volts or more. These very fast electrons produce other kinds of radiation similar to those found in cosmic rays. Radiations produced by betatrons can cause the liberation of atomic energy, and this may have practical importance in the production of such energy.

In Industry, in addition to the applications already

described, X rays are widely used to examine castings and other objects whose flaws may not appear on the surface. X rays are applied directly on the production line to examine metals, plastics, rubber insulation, and similar materials. Some machines have been developed which will take an X-ray picture of an entire automobile, although most X-ray machines concentrate upon smaller areas. During World War II a small X-ray machine, called the *Inspectoscope*, was used by the army to examine quickly the packages sent back home by returning soldiers. By use of the *Inspectoscope*, army and navy officials were able to determine whether any illegal arms or other objects were being sent back in the baggage of American troops.

Equipment. There are a great many different kinds of X-ray equipment, depending upon the application. The machines vary in size from that of dental X-ray equipment or small portable industrial units to the huge machines used for examining large castings, or the larger betatrons.

R.P.E.P.



Cross Section of a Betatron. The upper drawing is a sectional view looking down from above. The lower view is from the side. Electrons whirl around the acceleration chamber 250,000 times in $\frac{1}{240}$ second. The voltage of the electrons is increased until they are shot at a target with sufficient force to break up the nuclei of atoms.

Related Subjects. The reader is also referred to:

Breeding	Fluoroscope	Roentgen, Wilhelm
Cancer	Light (color plates)	Konrad
Electronics	Radioactivity	

XYLEM, *ZI lem*. See CAMBIUM.

XYLENE, *ZI leen*. See COAL TAR.

XYLOPHONE, *ZY loh fohn*, is the name of a percussion musical instrument. Players produce tones by striking the wooden sounding bars with hard mallets. Modern xylophones have a metal resonating, or sounding, tube under each bar. The lack of resonators in the first xylophones and their higher pitch were the chief distinguishing features between this instrument and the ma'imba.



J. D. Deagan, Inc.

The Simplicity of the Xylophone Makes It Easy to Play

The xylophone has a range of three octaves or more. It is used for special effects in orchestras and bands and occasionally for solo playing. Two similar instruments are the vibraphone and the orchestra bells. The vibraphone has metal bars and resonators. An electric motor operates a butterfly valve at the top of each resonator which helps produce a rich, brilliant tone.

The xylophone is a very old instrument. It is related to many Oriental instruments and was very common among the Slavic peoples. The sounding bars of the early instruments were often made of glass or pinewood. Rosewood is more commonly used now.

C.B.R.

See also MARIMBA; ORCHESTRA BELLS.

XYZ AFFAIR was the name given to an exchange of diplomatic proposals between France and the United States. In 1797 the relations between the governments of the United States and France were strained. The French Government was bitter because the United States had refused to help France in its war against Great Britain. French leaders were furious because the United States had signed the Jay Treaty with Great Britain in 1794. This treaty had brought to a peaceful settlement various American-British problems which had arisen from boundary and trade disputes. The angry French seized cargoes from United States ships, and forced United States seamen to serve on French vessels. The Directory, which then governed France, refused to receive General Charles Cotesworth Pinckney, whom President George Washington had appointed Minister from the United States.

President John Adams, who followed Washington, had no desire to declare war on France. So he sent three special ambassadors to France to seek a peaceful settlement. The ambassadors were Pinckney, John Marshall, and Elbridge T. Gerry. The French Foreign Minister, Prince Talleyrand, refused to talk directly with the Americans. Instead he appointed three agents to deal with them. The agents insulted the Americans with various dishonorable proposals. One proposal demanded from the Americans a loan for France and a large gift or bribe for Talleyrand. Ambassador Pinckney was reported to have answered this hint for a bribe with the words: "We have millions for defense, but not one cent for tribute."

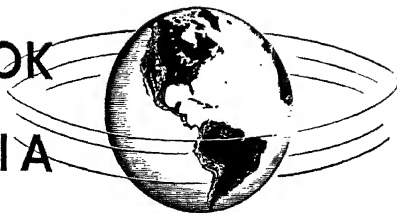
President Adams made an official report of these proposals to the United States Congress. He did not name Talleyrand's agents, but simply referred to them as X, Y, and Z. President Adams told Congress: "I will never send another minister to France without assurance that he will be received, respected, and honored as the representative of a great, free, powerful, and independent nation."

The United States did not declare war on France, but it did take steps to raise an army. American privateers received permission to attack French vessels. The XYZ Affair aroused indignation among citizens of both France and the United States. In 1800 a second American commission was able to arrange a friendly settlement of the difficulties between France and the United States.

E.C.BAR.

See also GERRY, ELBRIDGE T.; MARSHALL, JOHN; PINCKNEY, CHARLES C.; TALLEYRAND-PÉRIGORD, CHARLES M. DE.

THE WORLD BOOK ENCYCLOPEDIA



Yy

is the twenty-fifth letter of our alphabet. It probably came from the Semitic letter *vau*, from which our letters *f*, *u*, *v*, and *w* were also taken.

The Semitic peoples pronounced *vau* like our *v* or *w*. The Greeks used this letter as a vowel, and pronounced it with a sound not used in English. This Greek sound

FROM PICTURE TO LETTER



Egyptian 3000 B.C.	Sinai 1850 B.C.	Phoenician 1200 B.C.	Greek 600 B.C.	Roman A.D. 114
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was like a combination of *u* (oo) as in *sure* and *ee* as in *deep*. The Greeks named the letter *upsilon* and wrote it like our capital *Y*. The Romans did not use this letter in Latin, but took it over for writing Greek words. From this Roman use, the letter *Y* passed into the English alphabet. In English, *y* is used both as a vowel and as a consonant. As a vowel, the letter has all the sounds of *i* except that in *machine*. As a consonant, *y* is the first sound of words such as *you* and *young*. In old English, *y* stands for the old English letter *thorn*, which is no longer in general use. In such old English expressions as, "ye olden time," the letter *y* should be pronounced as *th*. See also ALPHABET; PRONUNCIATION. E.F.D.

YABLONOI, *YAH bloh NOY*, or **YABLONOVY, MOUNTAINS**. This mountain range lies east of Lake Baikal in Siberia. The range extends northeast from the northern part of Mongolia for about a thousand miles until it joins the Stanovoi Mountain system. The Yablonoi range is the dividing line between the rivers that flow into the Arctic Ocean and those that flow into the Pacific. Mount Sokhondo (8,040 feet) is the highest peak. G.B.Cr.

YACHTING, *yahting*. A yacht is a vessel used only for pleasure. Its name comes from a luxurious pleasure craft which was given to King Charles II of England by the Dutch. This Dutch vessel was of a kind known in the lowlands as a *jot*, or *jacht*, pronounced *yaht*. Laws governing merchant vessels do not apply to yachts, and many nations allow yachts to fly their own distinctive ensigns. The American yacht ensign has the same stripes and blue field as the national flag, but with thirteen stars arranged in a circle around a fouled anchor.

Types of Yachts. There are no special details about the hull or rig of a yacht which makes her different from any other craft. A yacht may be any kind of vessel,

from a small sailing boat to a steam-powered, ocean-going vessel. A yacht usually can be recognized by her speed, grace, and clean lines.

Sailing yachts are classified by their rigs. Racing yachts are further divided by their size or rating. Today, most racing is in "one-design" classes, in which all the yachts are alike. Before 1919 most sailing yachts had gaff-headed sails. These were four-sided sails with gaffs at the top and booms at the foot. Then it was found that a tall triangular sail with no gaff and a shorter boom at the foot was more efficient in sailing to windward. Gradually the triangular sail took the place of the gaff-headed sail. When the triangular rigs were first used they were called *Marconi* rigs, because they required elaborate wire rigging like the tall, slender masts of the early wireless stations. British yachtsmen did not accept this name and called their rig the *Bermudian*, or jib-headed, rig. Early yachts around Bermuda used a triangular sail. Today the jib-headed sail is used on most racing yachts, and it is also being adopted on cruising yachts.

The *sloop*, or *cutter*, rig is used on most racing yachts. Cruising yachts most often use the yawl, ketch, or schooner rigs. They make for easier handling on a larger



Auerbach, Pix

Start of a Yacht Race from San Francisco to Honolulu

boat by offering a better combination of sails to meet different weather and wind conditions. The chief rigs in common use today are the following:

Cat rig is the simplest rig of all. It consists of a single sail, called the mainsail, set on a mast set well up in the bow of the boat. Catboats are usually equipped with a centerboard to keep them from tipping. These boats are wide and ride high in the water. They were first used for fishing in the shoal waters around Cape Cod and on the big shallow bays of the Atlantic Coast.

The *sloop* is a single-masted vessel carrying a mainsail to the rear of the mast and usually a single, narrow, rectangular sail called a jib, or headsail, forward.

A *cutter* is a single-masted vessel like a sloop, but with two or more headsails instead of a single one. The mast is usually set farther aft than in a sloop. The term cutter refers to the rig alone in yachting talk, but in Great Britain where it was originated, a different kind of hull was developed for the rig. There is no exact difference between a sloop and a cutter. Many yachts may be called by either name.

The *yawl* is a two-masted boat, with the mainmast larger and placed about where it is in a sloop. The mizzenmast, or jigger, is much smaller and set well aft, behind the rudderhead or sternpost. The yawl carries either one or more headsails.

The *ketch* rig is very much like that of the yawl, and from a distance it is sometimes hard to tell the two apart. It has the mainmast and headsails placed as in a yawl, but the mizzenmast and sail are larger than in the yawl. The mizzenmast is set forward of the rudderhead or sternpost, or forward of the afterpoint where the hull meets the water. It is this position of the mizzenmast that makes the ketch different from the yawl. The ketch is very popular with cruising yachtsmen.

The *schooner* is also a two-masted vessel with a mainmast and a foremast. The larger mainmast is usually placed aft of amidships, and the smaller foremast is placed forward. The usual headsails are forward of the foremast. It is a handy rig, and one much used on cruisers. Large yachts may have a three-masted schooner rig, the masts being called fore, main, and mizzen. Often the aftermast sail is called the *spanker*.

The *staysail schooner* made its appearance soon after 1920. The space between the two masts was filled by triangular and four-sided sails hoisted on wire stays instead of the gaff-headed foresail. Many racing schooners are now rigged in this way, as they sail well into the wind.

Scow types are shallow-hulled boats, usually with two centerboards and two rudders. They are generally sloop-rigged, though a few have the cat rig. They are very fast, but they capsize, or upset, easily.

History of Yachting. As early as 1811 the Knickerbocker Boat Club was formed in New York City, but interest faded, and it died the next year. The Detroit Boat Club was founded in 1839, but in the beginning it was merely a club for rowing. The New York Yacht Club was formed in 1844 at a meeting aboard John C. Stevens' yacht, the *Gimcrack*. The Southern Yacht Club was organized in New Orleans in 1849, and other clubs sprang up along the Atlantic Coast. Yachting was

mainly popular in New England and New York waters up to the time of the War between the States. Many clubs were formed wherever there was pleasure sailing in the United States after 1865. Yachting has had a steady growth since that time. Today there are upwards of 500 yacht clubs devoted entirely to the interests of yachting and powerboating in the United States and Canada.

The most famous yacht races have been the international races for the America's Cup. This trophy was won in England by the yacht *America* in 1850, and has been defended by the New York Yacht Club ever since. It has been challenged twice by the Bay of Quinte Yacht Club, a Canadian club. But all other challengers have come from the British Isles. The American defender has always won the series, and only three single races had been lost by American defenders up to World War II.

The professional racing skipper and sailing master is seldom seen handling yachts in races. Larger vessels have professional crews, but these are sailed in races by their owners. In the big regattas at the famous yachting centers, such as Marblehead, Larchmont, and Chicago, fleets of over 300 take part in the racing, and all the yachts are handled by amateurs. In recent years, small seaworthy yachts have competed in long-distance ocean races, many of them across the Atlantic or from California to Hawaii.

H.A.CAL.

See also HOBBY (Books about Hobbies [Boats and Boating]); ICE YACHTING; LIPTON, THOMAS, SR.; MOTOR-BOAT; SAILING SHIP.

YADKIN RIVER. See PEE DEE RIVER.

YAFÄ, or JAFFA. See PALESTINE (The People; Cities).

YAHWEH, YAH weh. See JEHOVAH; JEW (Early History).

YAJUR-VEDA, YUJ oor-VAY dah. See VEDA.

YAK, yak, is the wild ox of Asia. It lives in the cold dry plateaus of Tibet, often more than 16,000 feet above sea level. The wild yak stands more than six feet high at the shoulders. But it carries its head low with the nose almost touching the ground. It may weigh between 1,100 and 1,200 pounds. The yak is covered with jet black or deep brownish black hair. The hair is especially long and silky on shoulders, flanks, and tail. Sometimes it may even drag on the ground. The yak is an agile creature in spite of its bulk and grotesquely heavy forequarters. It can slide down icy mountainsides, swim the swiftest rivers, and race across steep rock slides. If the yak is forced to defend itself, it charges furiously. Its courage and sharp horns (much like those of a cow) make yaks dangerous to hunt.

The domestic yak, often called the "grunting ox," is the result of a cross of the wild yak with Mongolian cattle. It is often white or piebald instead of black like the wild yak. Smaller and much more docile than its wild ancestor, it is useful in many ways to its owner. As a pack animal it can travel about twenty miles a day even when heavily loaded. In a country of half a million square miles without railroads and only 150 miles of telegraph lines, the yak carries travelers and mail. The soft hair of the domestic yak is woven into cloth, and the coarser hair is made into mats and tent coverings. Alive, the animal contributes rich milk



The Yak of Asia is a relative of the American bison. Yaks thrive in the high, cold mountains of Tibet.

New York Zoological Society

and butter. Dead, it supplies flesh which the people dry or roast for food. The hide is made into saddles, whips, boots, and other articles. The bushy tail, dyed red, is used as a fly chaser at ceremonial processions in India, and as an ornament for a tomb or shrine. V.H.C. See also ANIMAL (color plate, Europe and Central Asia).

Classification. The yak belongs to the family *Bovidae*. Its scientific name is *Bos grunniens*.

YAKIMA, Wash. (population 27,221), is an important fruit packing and shipping center. It lies in the rich Yakima Valley of south-central Washington, about 120 miles southeast of Seattle. The many irrigated farms of the valley furnish fruits, potatoes, hops, sugar beets, wheat, poultry, and dairy products for the city's processing and packing plants. The making of lumber and manufacture of clay products are also important industries in Yakima. Yakima was the name of an Indian tribe which formerly lived in the valley. It is the county seat of Yakima County. O.W.F.

YAKIMA, *YAK ih mah*, INDIAN. See INDIAN, AMERICAN (Table of Tribes).

YAKUTS, *yah KOOTS*. See LENA RIVER.

YALE, ELIHU (1649-1721), was a businessman and official in India. Yale University is named in his honor. He was born in Boston, and was educated in England. In 1687 he became governor of Fort Saint George in Madras, India. He was chosen a governor of the East India Company in 1699, and accumulated a large fortune. Yale then became interested in schools, and began to give liberally to different colleges. Among these was the Collegiate School at Saybrook, Conn., which later was moved to New Haven, Conn. Between 1714 and 1721 he gave the school books and goods which were later sold for about \$2,800. In 1718 the school changed its name to Yale University. H.U.F.



Chicago Historical Society
Elihu Yale, whose name was given to Yale University

YALE, LINUS (1821-1868). See CONNECTICUT; LOCK.

YALE UNIVERSITY is a privately controlled school for men at New Haven, Conn. Women are admitted to the graduate and professional schools. The university has eleven divisions, each under the supervision of its own dean and faculty. The divisions include the schools of engineering, medicine, divinity, law, fine arts, music, forestry, and nursing, the Sheffield Scientific School, the graduate school, and Yale College. Another branch of the University is the *Freshman Year*, which prepares students for entrance to Yale College, the Sheffield Scientific School, and the school of engineering.

Yale is the third oldest university in the United States. In 1701, ten Connecticut clergymen met in the village of Branford and made a gift of books for the founding of a college. Later in the year, the General Assembly of Connecticut enacted a charter for the *Collegiate School*, as it was then called. From 1702 to 1707, instruction was carried on in the home of Rector Abraham Pierson at Killingworth. The school was moved to Milford, and then Saybrook, before locating permanently at New Haven in 1716. Two years later it adopted its present name in honor of Elihu Yale, an early benefactor of the university.

The school is governed by the Corporation of Yale University. This group includes the school president, the governor and lieutenant governor of Connecticut, ten trustees, called *fellows*, and six alumni members.

Most of the freshmen live on what is called the Old Campus. Members of the three upper undergraduate classes live in ten residential colleges. The college plan of residence was begun in 1933 through the gifts of Edward S. Harkness. Each college has rooms for about 200 students, and has its own library, common room, dining hall, and kitchen. Each group is governed by a *master* who lives in the college.

About 40 per cent of all students support themselves wholly or in part by employment on the campus. About one third of the undergraduates receive scholarships, prize awards, and tuition aid in the form of long-term loans. A vocational guidance and placement bureau helps graduates to obtain work.

The *Yale Daily News* is the oldest college daily newspaper in the United States. The *Yale Literary Magazine* has the longest record for continuous existence of any literary magazine in America.

The Peabody Museum of Natural History and Anthropology, the Gallery of Fine Arts, and the Yale Observatories are associated with the school. Two other branches of Yale are the Institute of Human Relations and the Institute of International Studies.

The average resident enrollment is about 5,200. Many famous Americans were Yale men. They include Nathan Hale, Eli Whitney, Samuel F. B. Morse, Noah Webster, James Fenimore Cooper, President William Howard Taft, and Henry L. Stimson.

Yale College is the undergraduate school of liberal arts. It offers courses leading to the degree of B.A.

Sheffield Scientific School was founded in 1854. It offers courses leading to the degree of B.S.

School of Engineering was formerly a part of the Sheffield Scientific School. It offers courses leading to degrees of B.E., M. Eng., and D. Eng.

Graduate School in 1861 conferred the first Ph.D.



Gendreau

Harkness Memorial Tower of Yale University Rears Its Graceful Spire over the Roofs of Jonathan Edwards College

degree in America. Other degrees awarded are those of M.A., and M.S.

School of Medicine is the oldest professional school at Yale. A four-year course, open to graduates of approved colleges, leads to the degrees of M.D., M.P.H., and Dr. P.H.

Divinity School, formerly Congregational, is now undenominational. A three-year course leads to degrees of B.D. and S.T.M.

School of Law was founded in 1824. A three-year course leads to the degree of LL.B. Graduate work leads to degrees of LL.M., D.C.L., and J.S.D.

School of the Fine Arts gives professional instruction in architecture, painting and sculpture, and drama. Courses lead to degrees of B.F.A. and M.F.A.

School of Music offers a five-year course in the theory of music leading to the degree of Mus. B. The degree of Mus.M. and LL.M. are conferred for graduate work.

School of Forestry offers courses leading to the degree of M.B.

School of Nursing was established in 1923 by a gift from the Rockefeller Foundation. A thirty months' course leads to the degree of M.N.

R.G.L.

YALOBUSHA, *YAL oh BOOSH ah*, **RIVER**. See YAZOO RIVER.

YALTA, *YAHL tah* (population 25,100), is a seaport in the Russian Soviet Federated Socialist Republic. The city lies on the southeastern coast of the Crimean peninsula, at the edge of the Black Sea. Yalta has been a favorite Russian winter resort since the time of the Czars. The city gained importance as the scene of the Yalta Conference in February, 1945. See also YALTA CONFERENCE.

G.L.E.

YALTA CONFERENCE was a meeting held early in

1945 between the leaders of the "Big Three" United Nations. On February 3, President Franklin D. Roosevelt of the United States, Prime Minister Winston Churchill of Great Britain, and Premier Joseph Stalin of the Soviet Union met at the Livadia, an estate which once belonged to the Russian czars. Livadia lies two miles from Yalta, a famous Black Sea resort in the Crimea.

On February 11, the three leaders issued a statement of their agreements. These included policies and plans for the occupation of Germany. The three leaders also arranged for the San Francisco Conference and the organization of the United Nations, and again endorsed the principles of the Atlantic Charter. They discussed the setting up of a new Polish government and agreed tentatively on Poland's postwar boundaries.

Later reports of the Conference revealed that Stalin had promised that the Soviet Union would declare war on Japan within three months after Germany's surrender. In return for this promise, the Soviet Union was promised the Kurile Islands and the southern part of Sakhalin Island, which Japan then controlled, as well as various other important concessions.

P.S.W., JR.

See also SAN FRANCISCO CONFERENCE.

YALU, *yah lyoo*, **RIVER**. This stream of eastern Asia rises from the highest peak of the Changpai Shan, or Long White Mountains, of Manchuria. The Yalu then flows southwest and south for 300 miles. It forms most of the boundary between Korea and Manchuria, and empties into the Yellow Sea.

G.B.C.R.

YAM. This tropical plant has thick roots much like those of the sweet potato. Yams are good to eat. The

plant has long, slender, climbing stems, and bears small green flowers in clusters. The root contains less starch than the white potato, but has more sugar. It usually has an acid taste when raw, but this disappears when the yam is baked, boiled, or roasted. Large varieties of sweet potatoes are often wrongly called yams. See also SWEET POTATO.

L.A.So.

Classification. Yams make up the genus *Dioscorea* in the family *Dioscoreaceae*. The edible yam is *D. alata*.

YAMAMOTO, YAH mah MOH toh, ISOROKU (1884-1943), was commander in chief of the Japanese fleet at the time of the Japanese attack on the United States in 1941. At that time he was quoted as saying he was "looking forward to dictating peace to the United States in the White House." After the war evidence was found that Yamamoto actually feared the power of the United States and strongly opposed the Japanese attack. He was killed in the South Pacific when American aircraft shot down the plane in which he was flying.

Yamamoto was born in Nagaoka. His name was originally Takano, but he was later adopted by the wealthy Yamamoto family. He was graduated from the Naval Academy in 1904 and took part in the Battle of Tsushima in the Russo-Japanese War. Yamamoto was a Japanese delegate to the London naval conferences of 1929 and 1934. He was appointed commander in chief in 1939.

R.W.Mu.

See also DISARMAMENT; PEARL HARBOR.

YANCEY, WILLIAM LOWNDES (1814-1863), was an American statesman who was often called the "orator of Secession." He was born near the Falls of the Ogeechee, Ga. In 1836 he began to practice law and to edit a paper in Greenville, S.C., but two years later he moved to Alabama. There he entered politics, and in 1844 he was elected to the United States House of Representatives. As a youth he had opposed the doctrine of states' rights. But he changed his mind and resigned his seat in Congress in 1846 in protest against the government's treatment of the South.

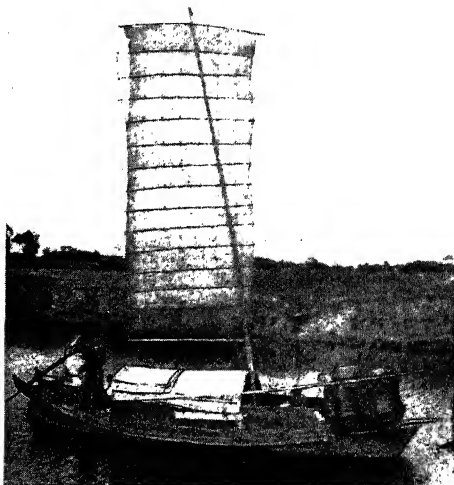
Yancey drew up an Alabama political platform which opposed the doctrine of the rights of settlers of new territories to decide whether the territories should or should not permit slavery. The Democratic convention of 1848 refused to accept Yancey's platform, and he began his work of arousing the South. He bitterly fought the Compromise of 1850 and tried to get Alabama to secede from the Union. In 1858 he urged the organization of committees of safety to "fire the Southern heart . . . and at the proper moment, by an organized, concerted action, precipitate the cotton states into revolution."

In 1860 Yancey led the opposition to the nomination of Stephen A. Douglas as the Democratic candidate for President. When he failed to prevent Douglas' nomination, he took the lead in forming the Constitutional Democratic party which nominated John Breckinridge. In the campaign that followed, Yancey gave many speeches in the North in defense of the Southern view. When Abraham Lincoln was elected, Yancey drew up Alabama's Secession Ordinance. He later served as one of the Confederate commissioners in Europe and was also a Confederate Senator from Alabama.

W.B.H.

See also COMPROMISE OF 1850; DOUGLAS, STEPHEN A.

YANGTZE KIANG, yahnng tseh, or YANGTZE RIVER,



Natori, Black Star

The Yangtze River Boat has four means of power. If there is no wind to blow against the sail, the boat may be pulled with a rope, sculled by the helmsman in the stern, or pushed with the bamboo pole.

is one of the great rivers of the world, and the longest and most important stream in China. The Yangtze rises in the Tang la Mountains of Tibet, 16,000 feet above sea level. The river flows east, southeast, and then south into the province of Yunnan. From here it winds about in a great double curve and flows northeast across Szechwan Province. It then follows an irregular course east through central China, and enters the Yellow Sea near Shanghai, 3,100 miles from its source. The Yangtze and its branches drain nearly 700,000 square miles.

The great height of the mountains at the Yangtze's source cause it to be a swift-flowing stream for most of its length. The great gorges in its upper parts above Ichang make it one of the most beautiful rivers in the world. In places the banks of the Yangtze are mountains over a mile high. About half of China's ocean commerce is distributed by the Yangtze and its branches. Ocean steamers reach Hankow, 680 miles from the river mouth, and smaller boats go 1,000 miles farther.

Thousands of Chinese live on the Yangtze on native sailing craft, called *junks*. Millions of Chinese live on the banks of this great river. Among the great cities along the Yangtze are Shanghai, Nanking, Kiukiang, Anking, the twin cities of Hankow and Wuchang, Ichang, and the wartime capital of Chungking.

G.B.Ck.

See also RIVER (illustration, Longest Rivers of the World).

YANK. This weekly newspaper for soldiers was published during World War II by the United States Army. *Yank* was written and edited by a staff of enlisted men. It was printed by the rotogravure process in twenty-four-page editions. *Yank* contained excellent features, and was credited with many exclusive stories on the course of the war. The first issue of *Yank* appeared on June 17, 1942. The paper was discontinued at the end

of 1945. *Yank* was read by 2,600,000 readers and was printed in twenty-one regional editions, which reached such faraway places as Iran, India, Egypt, England, and Hawaii.

YANKEE. People of other countries often call any person from the United States a Yankee. In the southern United States, the word *Yankee* means a Northerner, or someone who comes from north of Mason and Dixon's line. But most of the people of the United States use the word *Yankee* to mean a New Englander.

People often say that someone is "shrewd as a Yankee" or "clever as a Yankee." The people of early New England had to develop great shrewdness and cleverness as they struggled to make homes and create industries in the rocky wilderness. "Yankee peddlers" roamed far and wide through the American colonies, selling the articles made by Yankee craftsmen. These peddlers won such a great reputation for getting the best price for their goods that people today still say a sharp trader can "bargain like a Yankee."

No one is certain where the word *Yankee* came from. Some dictionaries state that the English word *Yankee* comes from the Scottish word *yankie*. There is some connection between the two words. A *yankie* is a sharp and clever woman. Other dictionaries suggest that *Yankee* is an Indian pronunciation of the word *English*, or of the French word for *English*, which is *Anglais*. The word *Yankee* may have had a Dutch origin. Early Flemish people sometimes called natives of The Netherlands

Jan Kees, which was short for the common Dutch names *Jan* and *Cornelis*. Some authorities believe that the people of Flanders gave the same name to Netherlanders who lived in the New World.

The first person to spread the word Yankee very widely was a farmer of Cambridge, Mass., named Jonathan Hastings. He used the word in the early 1700's to express the idea of excellence, speaking of a "Yankee good horse," or "Yankee cider." Harvard students who hired horses from Hastings began to use the expression. The word was widely used during the Revolutionary War, when British soldiers made fun of New England troops by calling them Yankees. During the War between the States, Confederate soldiers called Federal troops "Yankees." When United States troops arrived in Paris in 1917, the French press hailed them as Yankees or Yanks. Europeans have continued to use the word as a name for American soldiers.

J.R.A.

See also **YANKEE DOODLE.**

YANKEE DOODLE is a song that has been popular in America since colonial days. The tune is an old one. It may have begun in southern Europe in the Middle Ages. About 1500 it was popular in Holland, where the harvesters sang it. The verses began with the meaningless words:

Yanker dudle doodle down.

The song was sung to small children in England during Shakespeare's time. Later the tune was used for a rhyme that began:

1. Fa - ther and I went down to camp, A - long with Cap - tain Good - win, And
2. And there was Cap - tain Wash - ington, Up on a slap - ping stal - lion, And
3. And then the feath - ers on his hat, They looked so 'tar - nal 6 ny I
4. And then they had a swamp - ing gun, As big as a log of ma - ple,

there we saw the men and boys, As thick as has - ty pud - din'. Yan - kee Doo - dle keep up,
giv - ing or - ders to his men, I guess there was a mil - lion.
want - ed pes - ke ly to get, To give to my Je - mu - na.
On a deuc - ed lit - tle cart, A load for fa - ther's cat - tile

Yan kee Doo - dle dan - dy, Mind the mu - sic and the step, And with the girls be hand

Lucy Locket lost her pocket,
Kitty Fisher found it;
Nothing in it, nothing in it,
Save the binding round it.

Another English form of "Yankee Doodle" was sung by the Cavaliers in the 1600's. They made up the words to poke fun at Oliver Cromwell when he rode down from Canterbury to take charge of the Puritan forces.

Yankee Doodle came to town
Upon a Kentish pony,
He stuck a feather in his cap
And called it macaroni.

At that time the word *macaroni* was used to mean the young men of London who dressed in odd Italian styles.

The words of "Yankee Doodle" known in the United States were written by an English army surgeon, Dr. Richard Schuckburgh. The song made fun of the untrained American troops during the French and Indian War in 1755. But the Continental soldiers liked the tune and it soon became popular. The song was well known all through the colonies by the time of the Revolutionary War. The first printed notice of it in America was in the *New York Journal* of October 12, 1768.

"Yankee Doodle" was sung and played in every patriot camp during the Revolution. The American soldiers often whistled the tune in battle as they fought Indian-style by firing from behind trees and walls. It was heard so much during the British retreat from Concord that General Gage is said to have exclaimed: "I hope I shall never hear that tune again!" But the British did hear it again, and under even more embarrassing conditions. American bands played the tune as the British soldiers marched away after the surrender at Yorktown.

R.KEN.

YANKTON, S.D. (population 6,798). This wholesale and retail center is situated on the Missouri River in southeastern South Dakota. Yankton was first settled in 1858, and named for the Yankton tribe of the Sioux Indians. It became the capital of the Dakota Territory, organized in 1861 to include North Dakota, South Dakota, and all the territory west to the Rocky Mountains. Yankton was an important river port before the railroads came.

R.V.H.

YANKTON COLLEGE is a coeducational, liberal arts school at Yankton, S.D. It is controlled by the Congregational Church. The school has a college of liberal arts, a conservatory of music, and a school of theology. Yankton was founded in 1882 and has an average enrollment of about 450.

R.W.SP.

YAOUNDE, YAH OON DAY. See CAMEROUN.

YAP is a small island group in the western Pacific Ocean. The group is part of the Caroline Islands. It lies about 1,000 miles east of the central Philippine Islands and about 1,575 miles south of Yokohama, Japan. The four small islands of the group cover an area of eighty-five square miles, and have a population of 6,650.

The surface of the islands is rugged and broken. Much of the land is coral sand. Long, narrow channels separate the islands. They are surrounded by coral reefs. One large break in the reefs allows small vessels to enter a natural harbor. Palm trees and thick underbrush grow everywhere on the islands.

The people are Micronesians with mixtures of Indonesian stock. They are light brown in color and well developed physically. The women do most of the work in the fields, but have little to say about the islands' affairs. Rice, bananas, yams, coconuts, and tropical fruits are the main crops. The men catch fish by diving under water and spearing them. The people also raise chickens for food.

Yap was first discovered and controlled by Spaniards. In 1899 Spain sold the island group to Germany. For many years only an occasional European trader visited Yap. One trader introduced the use of huge stone discs for money. He brought these from the near-by island of Palau, and traded them to the natives for coconuts.

In the early 1900's Yap became internationally important as a station for the cable which ran between the United States, the Netherlands Indies, and Japan. After World War I, the League of Nations made Yap a Japanese mandated island. The United States protested this action and asked that the islands be put under international control. In 1921 the United States and Japan signed a treaty by which the United States recognized the Japanese mandate. In return Japan granted the United States equal rights to cable and radio service through Yap, and agreed to permit free entry of United States citizens into the islands. In the late 1930's the United States frequently protested the Japanese fortification of Yap.

During World War II, United States planes often bombed Yap, although the Japanese used the island group only as a minor naval base. Yap was occupied by American troops after the end of the war. E.E.E.

See also CAROLINE ISLANDS; PACIFIC ISLANDS (map).

YAQUI, YAH kee. The Yaqui are members of a Mexican Indian tribe. They once lived in villages in the state of Sonora, but they were moved to the states of Tehuantepec and Yucatan by the Mexican Government.



Ford Motor Co.

The Legal Yard in the time of King Henry I of England was the distance from the king's nose to about the end of his thumb.

YARD. The yard is a unit of length in the English system. It is equal to three feet, or thirty-six inches. Originally, the yard was supposed to be equal to the length of the arm of the English king, Henry I. In 1866 a British law was passed which established the yard as the length of a certain bronze bar at 62° F. In the United States it is defined as being equal to $\frac{3}{8} \times \frac{3}{8}$ of one meter. The yard is used in measurements in the textile industry. The cubic yard is a unit of volume which is commonly used in construction work. See also WEIGHTS AND MEASURES. E.G.Sr.

YARDLEY, HERBERT OSBORN (1889-). See CODES AND CIPHERS (Some Famous Cryptanalysts).

YARKAND, YÄHR KAHND, or SOCHE, *soh cheh* (population 70,000), is a trading center in southwestern Sinkiang Province, China. It lies about 700 miles north of New Delhi, India, in the region known as Chinese Turkestan. The city has been a station on the trade routes of Asia since ancient times.

YARMOUTH. See ENGLAND (Cities).

YARMOUTH, YÄHR muth, Nova Scotia (population 7,790), is the southwestern gateway into this Canadian province from the United States. Here the Dominion Atlantic Railway and the southwestern branch of the Canadian National meet, by different routes, the steamers which sail between Yarmouth and Boston. Yarmouth is an attractive summer resort, and the center of an agricultural community. It is claimed that Yarmouth was the site of the first settlement of Norsemen in North America, long before the arrival of Columbus or Cabot. The site of Yarmouth was named Cap Fourchu (the forked cape) by Samuel de Champlain, the French explorer, in 1604. In 1759 Yarmouth became the center of a township granted to settlers from New England. In the golden age of sailing ships it was one of the biggest centers of shipbuilding in Nova Scotia. D.C.H.

YARMOUTH BLOATER. See HERRING.

YARN. See COTTON (Manufacturing); WOOL.

YARROW is a small flower of the North Temperate Zone. It grows between eight inches and two feet high, and bears clusters of small flowers colored white, yellow, or pink. It is grown in garden borders and sometimes in rock gardens. The yarrow blooms from spring to summer. It is usually grown from divisions. See also SNEEZEWORT. T.J.

Classification. Yarrows belong to the genus *Achillea* of the family *Compositae*.

YAVAPAI, YÄH vah PI, INDIAN. See INDIAN, AMERICAN (Nomads of the Southwest).

YAWATA. See JAPAN (Cities).

YAWL. See YACHTING.

YAWNING is the act of opening the mouth wide, or gaping. The usual yawn is not done on purpose, and is due to drowsiness, or fatigue. It is a sign that the body is ready for sleep.

Yawning is an involuntary reflex connected with the act of breathing in, or inspiration. After the act has started, it is difficult if not impossible to stop it. The person can hold his mouth closed, but the yawning muscles continue to contract.

People and animals yawn when oxygen is slowly cut off from them, and when the muscles are thoroughly relaxed. A person who yawns very often is probably not

getting enough oxygen to his tissues. He may need better ventilation, or exercise. Yawning after a heavy meal shows the need for exercise. The person will generally stop yawning if he drinks a refreshing beverage, or bathes his face with cold water. Yawning is also caused by suggestion from the brain. Persons who see others yawning are likely to yawn too.

Scientists are not sure what part of the nervous system controls yawning, but it may be the hypothalamus in the brain. This organ may be disturbed in sleeping sickness, so that the patient yawns for days.

It is not certain what good it does to yawn. It may awaken a person by stretching the muscles and helping the blood to circulate. It may also make a person seek sleep. A yawning infant seems to stretch cramped muscles, after which he can sleep.

Yawning may also mean simply *opening*. Shakespeare uses the word in this way when he writes of "the witching hour of night, when graveyards yawn, and graves give up their dead." But when he writes of "the lazy yawning drone," he suggests that the drone is drowsy and ready for sleep. A.C.I.

See also FATIGUE.

YAZOO, YÄZ oo, RIVER. The Indians gave this deep, winding branch of the Mississippi River the name *Yazoo*, which means *river of death*. The river is so deep that boats can travel nearly its entire length. The Yazoo is formed near Greenwood in central Mississippi by two other rivers, the Yalobusha and the Tallahatchie.

The Yazoo winds slowly southwest for 300 miles, and flows into the Mississippi at Vicksburg. The chief towns on the banks of the Yazoo are Yazoo City, which has cotton mills and factories making cotton by-products, and Greenwood, an important shipping center in the cotton industry. The Yazoo Delta, between the Yazoo and the Mississippi, is a section of rich farm land. L.D., Jr.

YEAR. A year is the time the earth takes to make one complete revolution around the sun. There are many different kinds of years which are recognized by astronomers. The *solar*, *equinoctial*, or *tropical* year is the time between two passages of the sun through the vernal equinox, in March. This year is 365 days, 5 hours, 48 minutes, and 45.7 seconds long. This year is used for all practical and astronomical purposes. It is the basis of our common or calendar year.

The calendar year is only 365 days long, and so we have to add an extra day every four years to correct the difference in time between the calendar year and the solar year. This fourth year is called *leap year*, and the extra day is February 29. But adding an extra day every leap year makes the calendar year 11 minutes 14 seconds too long. Therefore, leap year is omitted in the century years, except those which can be divided by 400. The years 1700, 1800, and 1900 have had only 365 days. The year 2000, however, will be a normal leap year and contain 366 days. Under this arrangement, the difference between the calendar year and the solar year will vary only one day over a period of several thousand years.

The *sidereal* year is made up of 365 days, 6 hours, 9 minutes, and 9.5 seconds. This is the time it takes the earth to return to the same place in its orbit with reference to the fixed stars. The sidereal year is longer than the solar year because of the precession of the

equinoxes. The sidereal year is seldom used except in the calculations of astronomers.

The *lunar year* is made up of twelve lunar months. This was the year used by the ancient Greeks and contained 354 days.

In most Christian nations the calendar year begins on January 1. During the Middle Ages, however, most European nations considered March 1 or March 25, Annunciation Day, as the first day of the calendar year. By 1600 nearly all civilized countries except England recognized January 1 as the first day of the year. England adopted the Gregorian calendar, which recognized January 1 as the beginning of the year, on January 1, 1752.

The Church calendar, which is used in the Roman Catholic and in most Protestant churches, is regulated partly by the solar and partly by the lunar year. This causes a difference between the fixed feast days, which always fall on the same day every year, and movable feasts such as Easter, whose dates vary from year to year. The fixed feast days are determined by the solar year. Movable feast days are determined by the lunar year.

In ancient Roman times, before the Julian calendar was adopted, the year began on March 1. The Jewish year begins at the time of the autumnal equinox, around the 22nd of September. The Mohammedan year, however, is based on the changing phases of the moon and lasts for 354 days. Therefore, the beginning of the Mohammedan year continually falls earlier in the seasons. Thirty Mohammedan years make up a cycle during which there are eleven leap years at irregular intervals.

P.50.

See also CALENDAR; CHRONOLOGY; EQUINOX; LEAP YEAR.

YEAR OF CONFUSION. See CALENDAR (Julian Calendar).

YEAST, yeast. The "yeast" with which people are most familiar is a substance that bakers put in dough to make it rise. This "yeast" contains a mass of tiny, one-celled plants called yeasts. Yeasts are among the simplest kinds of plants. Like mushrooms, they belong to the group of plants called *Fungi*.

Yeasts increase very rapidly, and the tiny plants are floating in the air almost everywhere. Some yeasts form new plants by a process called budding. A small part of the cell wall swells out, and a wall of cellulose soon shuts off this new growth from the parent plant. It becomes an independent cell, and soon grows other buds. Sometimes all the cells cling together in chains

that later break up. Some yeast plants increase simply by dividing in two. This process is called *fission*.

The French scientist, Caignard de la Tour (1771-1859), discovered in 1857 that yeasts are living plants which increase by budding. He also found that these plants can act on sugar to change it to alcohol. This important chemical change is part of a process of fermentation, which yeasts produce in organic substances. It is a result of the way yeast plants get their food. While each cell is growing, it produces substances known as *enzymes*, or *ferments*. Yeasts may form two enzymes, called *zymase* and *invertase*. Enzymes cause fermentation by breaking down starch and sugar in solution. The yeast cells get their food from these solutions. Diastase breaks down starch. Invertase causes one sugar to form another sugar. Zymase breaks down the sugar. Zymase and invertase can work only in the right moisture and temperature (about 80° to 85° F.).

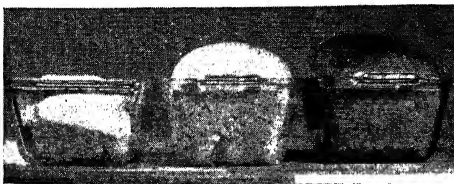
Bakers use two forms of commercial yeast—the dry and the compressed. Dry yeast is made by mixing yeast mass and corn meal into cakes, and drying them. In this form the yeast cells are inactive, or dormant. They will keep indefinitely without spoiling, and become active only when they are mixed with the right material. Compressed yeast, the other commercial form, contains enough starch and moisture to start fermentation in a short time. It cannot be stored in the house very long without spoiling, and must be kept in a cool place until it is used.

Mixing yeast with dough to ferment it is called *leavening* the dough. With dry yeast, the baker must first make a "sponge." This is a mixture of yeast, flour, and water. Sugar may be added to hasten the fermentation. The sponge is allowed to stand a few hours—sometimes overnight. Then it is mixed with flour and more liquid—water, milk, potato water, or whey—to make the dough. This dough is kneaded thoroughly, covered, and set to "rise." With compressed yeast, the baker does not have to prepare a sponge.

Enzymes from the yeast cells attack the starch in the flour, and change it to sugar. The sugar is then changed to alcohol and carbon dioxide gas. The gas bubbles up through the mixture, forming the familiar bubbles in bread dough, and making the mass light and porous. When the bread is baked, the alcohol evaporates and the yeast plants are destroyed. If bread is baked properly, it should have no taste of alcohol or yeast. Sometimes dough is left to rise too long, and the fermentation forms acid. This condition results in sour bread.

Fermentation by yeast is also an important process in making beer.

In the days before yeast cakes were sold in the stores, housewives made their own yeast. They prepared a batter of flour, potato water, salt, and sugar, and left it uncovered for several hours. Yeast cells in the air furnished the enzymes. This process was uncertain, because types of yeast not suitable for bread sometimes lodged in the batter. Some housekeepers still like to use this old-fashioned liquid yeast. But they may also buy prepared yeast and add a small amount to make sure of the quality. The mixture will keep a long time in a cool place.



Fred Korth, Wheat Flour Institute

The Action of Yeast on Bread Dough. At left, the yeast has just been added to the dough. In about two hours it has caused the dough to rise (middle) to about twice its original size. At the right is the baked loaf of crusty, tasty bread.

Commercial yeast is prepared by grinding corn and rye to a mash and mixing it with filtered water. Sprouted barley, or malt, is then added. The malt changes the starch in the grain to malt sugar. Next, a culture of the bacteria which turns milk sour is added to the mixture. The mash is then filtered. The liquid, called *wort*, is then ready to serve as food for living yeast cells. The yeasts increase rapidly in this liquid. When the fermentation of the wort is violent, the yeast is skimmed off. It is pressed to free it from water. Finally the mass is molded, and cut into cakes. Starch is usually added to compressed yeast before the pressing, but the starch must be mentioned on the label. L.H.T.

See also BREAD; BREWING; FERMENTATION.

YEATS, *yates*, WILLIAM BUTLER (1865-1939), was an Irish poet and dramatist and the foremost figure in the modern Irish literary revival. He was born in Dublin, the son of J. B. Yeats, a portrait painter. He lived in London as a child, but spent his vacations with his grandparents in County Sligo. Yeats studied art for three years, but in 1889 his first collection of poems, *The Wanderings of Oisín*, was published, and he decided to earn his living by writing. During the next ten years, he produced some of his most popular works. These include the lyrics in *The Wind Among the Reeds*, and his poetic dramas, *The Land of Heart's Desire*, *By Shadowy Waters*, and *The Countess Cathleen*.



Ewing Galloway
William Butler Yeats, one of the greatest of modern Irish poets

Yeats wanted to interest the Irish people in the Irish drama, and in 1893 he founded the National Literary Society. A few years later, with the help of friends, he established the Irish Literary Theater, which opened in 1899 with Yeats' *The Countess Cathleen*. The Literary Theater ended with the season of 1901. But two years later the Irish National Theater Society was founded, and in 1904 the society was granted the use of the Abbey Theater of Dublin. Yeats became a director, and started writing plays for the Abbey cast as well as dramatic criticisms.

Yeats changed his style after he was fifty. He turned from elfin songs and pretty fancies, and used a sharper language closer to common speech. His poetry did not suffer from the change. On the contrary, it achieved a greater vigor and a stricter form.

Yeats was interested in politics, and in 1922 became a member of the Seanad Éireann (Irish Senate). He also served as Minister of Fine Arts in the Dublin Cabinet. In 1923 he was awarded the Nobel prize for literature. See also NOBEL PRIZES. L.U.

His Works. His plays in prose and verse include *Cathleen ni Houlihan*; *The Pot of Broth*; *The Hour Glass*; *Four Plays for Dancers*; and *Fighting the Waves*. Other poems appear in such books as *Responsibilities*; *The Wild Swans at Coole*; *Later Poems*; and *The Tower*. His prose

includes *The Secret Rose*; *The Tables of the Law*; *The Adoration of the Magi*; and *Plays and Controversies*.

YEDO, *YED oh*, or YEDDO, in Japan. See TOKYO.

YELLOW is one of the basic colors found in light and pigments. It lies about in the middle of the spectrum of visible light. It is considered a primary color. When mixed with blue, yellow forms green. Mixed with red, it makes orange. When blue, yellow, and red lights are mixed together, white light results. Because the sun looks yellow, some primitive tribes consider yellow a sacred color. Yellow is the national color of China.

Strong light makes yellow appear more intense, although it dims most other colors. Lemon and canary yellow are considered pure yellow. The ancients used saffron from the crocus plant as their principal yellow dye. Gamboge yellow made from gum resin is widely used by artists today. G.MAN.

See also COLOR; SPECTRUM and SPECTRUM ANALYSIS.

YELLOW BELL. See FLOWER (color plate, Mountain Flowers).

YELLOW-BELLIED FLYCATCHER. See FLYCATCHER.

YELLOW BIRCH. See BIRCH.

YELLOWBIRD is another name for the goldfinch. See GOLDFINCH.

YELLOW-BREASTED CHAT. See CHAT.

YELLOW CEDAR. See CYPRESS.

YELLOW DAISY. See BLACK-EYED SUSAN.

YELLOW FEVER is an infectious virus disease that attacks the liver and digestive tract. One of its usual symptoms is jaundice, which turns the skin yellowish. The bite of a mosquito, *Aedes aegypti*, carries yellow fever from person to person. This insect picks up the virus by feeding on the blood of a person who has yellow fever.

Yellow fever once spread death through whole cities in many parts of the world. The use of modern methods has brought yellow fever under control in large tropical cities. But the disease still exists in large areas of Africa and South America. The conquest of the disease is a triumph of modern medicine. Important work was done by the Walter Reed Commission in Cuba, Dr. William Gorgas in the Panama Canal Zone, and the Rockefeller Foundation in Central and South America and Africa. The Japanese doctor, Hideyo Noguchi, also made valuable experiments on the disease in the course of which he lost his life.

A mosquito can pick up the yellow fever germ if it bites a patient during the first three days of his illness. Twelve days must pass before the mosquito's bite can transmit the disease. After that, the insect can infect people as long as it lives.

An attack of yellow fever begins from one to six days after the person is bitten. Most cases of the disease run through three stages. In the first stage the patient has headache, high fever, and rapid pulse. Later, his pulse rate tends to fall. He has other pains in the head, limbs, and back. He vomits, and has albumin in his urine. The second stage brings some relief of these symptoms, but they become even worse in the third stage. Then the skin turns yellow, and the patient may vomit black blood, or black vomit.

The virus of yellow fever has been injected into mice,

and a vaccine can be made from them. Persons traveling in yellow fever areas can use this vaccine for protection. All soldiers assigned to yellow fever areas are now inoculated with a yellow fever vaccine. P.R.C.

See also GORGAS, WILLIAM C.; JAUNDICE; NOGUCHI, HIDEYO; REED, WALTER.

YELLOW-FINNED GROUPER. See FISH (color plate, Tropical Salt-Water Fish).

YELLOW FLAG. See QUARANTINE.

YELLOW GOLD. See ALLOY (Costly and Ornamental Alloys).

YELLOW HAIR. See CUSTER, GEORGE ARMSTRONG (illustration).

YELLOWHAMMER is the popular name of two North American birds. These are the *northern flicker* and the *southern crested flycatcher*. The northern flicker is a brown woodpecker, about a foot long, with an ashy gray head. It ranges from the northernmost forests of Canada to southern Illinois and North Carolina. It spends much of its time on the ground, searching for ants. The southern crested flycatcher ranges from South Carolina to Central America. It is about eight and one-half inches long, and is colored olive brown with yellow under parts. See also FLICKER; FLYCATCHER. L.A.H.A.

Classification. The northern flicker is *Colaptes auratus luteus* in the *Picidae* family. The southern crested flycatcher is *Myiarchus crinitus crinitus* in the *Tyrannidae* family.

YELLOW-HEADED BLACKBIRD. See BLACKBIRD.

YELLOW JACKET. The yellow jackets are small wasps with black and yellow stripes. They belong to the group called the social wasps, and are relatives of the hornets. Yellow jackets, like hornets, make their nests of paper. They form the paper by chewing up old wood and plant fiber. Yellow jackets produce a finer paper than hornets. The nests have several stories of cells inside a thick paper covering. There are three classes among these wasps.



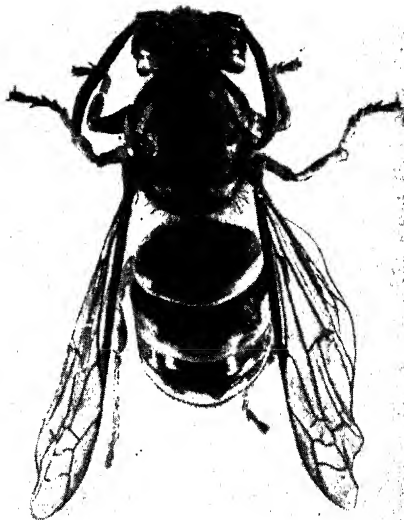
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The European Yellowhammer. The flicker of North America is called "yellowhammer" in many localities.

They are the workers, queens, and the males, or drones. In this respect, the wasps resemble the bees.

Yellow jackets sometimes hang their nests from trees or bushes. Sometimes they build them under the ground, in the abandoned holes left by gophers and field mice. Sometimes they build their nests in the hollows of stumps or stone fences.

The habits and life history of yellow jackets are like those of the larger wasps. They eat the nectar and juices of ripe fruit, and do some damage to orchards and market gardens. But they fully make up for this damage



Gayle Pickwell

Three Castes of the Yellow Jacket Are the Male (Left), the Worker (Center), and the Queen (Right)



L. W. Brownell

Nest of the Yellow Jacket

by destroying many harmful insects. C.D.D.

See also WASP.

Classification. Both yellow jackets and hornets are insects of the genus, *Vespa*. There are various species. They are sometimes placed in a separate genus, *Vespula*.

YELLOW JASMINE, *JASMIN*, or **CAROLINA JESSAMINE**. See FLOWER (color plate, Woodland Flowers); GELSEMIUM.

YELLOW JOURNALISM.

See NEWSPAPER (History [Chains and Consolidations]).

YELLOW LADY'S-SLIPPER. See LADY'S-SLIPPER.

YELLOWLEGS is the name of two kinds of snipe. These birds have black and white markings and long yellow legs. They live along shores and marshes while they are flying north in the spring. They nest in northern North America. In the winter they fly as far south as southern Chile, in South America. The two kinds of yellowlegs differ only in size. The greater yellowlegs averages fourteen inches in length, while the lesser averages a little over ten inches. Yellowlegs lay three to four tan eggs. They have a flutelike whistle, which was easily imitated, and was used to entice them down to decoys. Yellowlegs became rare birds by too much hunting, but they are now protected by Federal laws, and are again becoming common. See also BIRD (color plate, American Water Birds). A.M.B.A.

Classification. Yellowlegs belong to the family *Scolopacidae*. The greater is *Totanus melanoleucus*; the lesser, *T. flavipes*.

YELLOW PERCH. See FISH (color plate, Fresh-Water Fish); PERCH.

YELLOW PUCCOON, or **YELLOWROOT.** See GOLDEN-SEAL.

YELLOW RACE. See RACES OF MAN.

YELLOW RIVER. See HWANG HO.

YELLOWs is a name for jaundice in dogs, sheep, and other animals. Jaundice is due to an improper flow of bile. Two common forms occur in dogs, one due to an abrupt stoppage of gallstones, the other to inflammation and hardening of the liver, which is often seen after distemper. The mucous membrane, skin, and whites of the eyes turn yellow. Other symptoms are vomiting, constipation, and green or deep yellow urine. Treatment should begin by feeding a scant diet free from fat. Baking soda by the mouth or as an enema acts as a laxative, to help remove the obstruction. Calomel, brandy, and sour milk are used, but exert little specific action.

An infectious form of yellows is sometimes called canine typhus. It is caused by spirochetes, which are thought to be carried by rats. Besides the yellow color, the dog has a high fever, bleeding gums, and poor appetite. It may vomit and show bloody bowel discharges. A serum and a vaccine for this disease are sometimes useful. In fighting the disease it is important to control rats, since the disease is carried from rats by ticks. Then the living quarters of infected dogs should be disinfected

to rid the premises of the yellows-infected ticks. R.C.K.L.

See also BILE; JAUNDICE.

YELLOW SEA. The Pacific Ocean extends inland for about 600 miles between the east coast of China and Korea. Here, the waters along the banks of the ocean are a yellow, muddy color, and the Chinese have named this arm of the ocean the *Hwang Hai*, or *Yellow Sea*. The *Hwang Hai* gets its color from deposits of yellow earth, or *hwang-tu*, brought down to the sea by the Hwang and Yangtze rivers.

The sea is over 300 miles wide at its widest point, and about 300 feet deep in its deepest part. It covers a total area of 80,000 square miles.

Shanghai lies on the Yellow Sea, near the mouth of the Yangtze. Weihaiwei, a former British possession, is on the Chinese coast farther north. Port Arthur, of Russo-Japanese War fame, is at the southern end of the peninsula which separates the Yellow Sea from the Gulf of Korea at the north. The Strait of Korea connects the Yellow Sea with the Japan Sea. At the north, the sea forms the Korean, Liaotung, and Pechili, or Pohai, gulfs. H.U.S.

YELLOWSTONE LAKE. See YELLOWSTONE NATIONAL PARK.

YELLOWSTONE NATIONAL PARK. More than half a million visitors to Yellowstone each year agree that Yellowstone National Park is one of the world's wonderlands. It was established in 1872 and was the first national park in the United States. The park is about two thirds as large as Connecticut. It occupies 3,453.13 square miles in the northwestern corner of Wyoming and overlaps into Montana and Idaho.

Yellowstone Park lies on a plateau about 8,000 feet above sea level. The Snowy Mountains are on the north, the snow-capped peaks of the Absarokas are on the east, the Tetons are on the south, and the Gallatin range lies to the west and north. The highest mountain entirely within the park is Electric Peak (11,155 feet).

Great forests of lodgepole pine, spruce, and Douglas fir cover about four fifths of the park's area. Hayden and Lamar valleys are covered by thick growths of grass and flowers during the short summer in this region. The ground in the geyser region of the park is a light gray because it is covered by a thin layer of silica called the *formation*.

Yellowstone is the oldest large wildlife preserve in the United States. Hunting is forbidden in the park. The forests and valleys support a number of large animals, including elk, deer, antelope, mountain sheep, buffalo, moose, and grizzly bear. Most of these animals have lost their fear of man after many years of protection. The rivers and lakes are the homes of waterfowl, and the forests shelter many birds and small animals. New stocks are added each year to the great numbers of fish in the lakes and streams. Fishing is allowed under government regulations. The park is famous for some of the best fishing in the west. The fish are mostly trout, chiefly cutthroat or blackspotted, rainbow, Loch Leven, and eastern brook trout.

The Wonders of the Park

No other place in the world of the same size has as many natural wonders as Yellowstone National Park.



Ansel Adams, courtesy U.S.

Old Faithful Geyser spouts a silvery cascade of steaming water high into the air—a beautiful and inspiring sight.

Geysers, hot springs, sparkling lakes and rivers, deep gorges, and high cataracts are among the many attractions. The beautiful coloring of Yellowstone Canyon includes great splashes of yellow, red, white, orange, and brown set against the green of the surrounding forests and the blue of the sky.

Geysers. There are six main geyser areas or basins in the park. Four of these, the Norris, the Upper, the Midway, and the Lower basins, are along the route usually taken by tourists. The Upper Basin is a valley about a mile and a half long and half a mile across. About seventy large geysers are along the banks of the Firehole River.

Over 200 active geysers in the park make it the greatest geyser region in the world. The geysers differ widely in size and the volume of water and steam they spout. The smallest are tiny fountains which shoot streams of water four or five feet into the air. The largest throw columns of water as high as 200 feet, and flow for two to three hours. The Giantess Geyser has been known to spout water for thirty-six hours.

Old Faithful is the best-known of the geysers. It is not the largest, but it has become famous because it is so regular in its activity. Since it was first discovered in 1870, it has spouted on an average of every sixty-five minutes, summer and winter. It shoots silvery cascades 120 to 170 feet in the air, and each display lasts about



A Hot Spring in Yellowstone furnishes this tourist a convenient place to cook lunch.



t. of Interior; Eisenstadt, Pix; J. E. Haynes, courtesy U.S. Dept. of Interior

Deer Graze, friendly and unafraid, in the "front yard" of the headquarters area of Yellowstone National Park.

four minutes. In this time the geyser sends up about 10,000 gallons of water at a temperature of about 200° F. Other geysers of special interest are the Beehive, the Castle, the Grotto, the Riverside, the Giant, the Grand, the Daisy, and the Lion.

The Giant Geyser is known as the largest in the park. It throws its water up to 175 feet. For a time the Imperial Geyser, which first spouted in 1928, threw out a greater amount of water than the Giant. But later it died out and it is now only a great pool. The Imperial was regarded as one of the most spectacular geysers ever known in Yellowstone, except the Excelsior, which has not been known to erupt since 1890. The crater of the Imperial was a great dish, 100 to 120 feet across and about eight feet deep. It hurled water in all directions in great explosive outbursts. For over a year it was throwing water as high as 50 to 95 feet for periods of four or five hours at a time.

Geyser waters contain solutions of silica. This is left, a little at a time around the walls of the geyser's crater. Through the years this silica deposit has built beautiful mounds of many colors around the craters. The Beehive, the Castle, and the Grotto geysers take their names from the form of their craters. The crater of the Oblong geyser is a rainbow of delicate tints. It is one of the most colorful sights in the park.

Hot Springs. There are more than 3,000 hot springs

in Yellowstone Park. The floors of the geyser basins are covered with these springs. The temperature of the spring waters ranges from 116° F. to boiling (212° F.). Many of them actually boil, and others bubble like boiling water because of escaping gas.

The Mammoth Hot Springs, five miles from Gardiner, Mont., are the most famous of all the rock-depositing springs. The hot waters contain limestone which is deposited upon the surface over which the water flows. These springs have built up a series of terraces which shape up in the form of a small mountain. They cover 2,000 acres and reach as high as 300 feet. The terraces have a rare beauty because of their delicate structure and different colors. Some are bright yellow, some are brown, and others are the color of terra cotta. The colors are largely the result of plant life, called algae, in the water. The water is crystal clear, and the reflection from the bottom of the spring basins gives it a delicate blue tint. Many of the hot springs in the geyser basins are interesting because of their beautiful colors. Grand Prismatic Spring in the Midway Geyser Basin is a pond of boiling water whose surface reflects all the colors of the rainbow. Morning Glory Spring is a picture of the flower it is named for. Emerald Spring was named for its rich green coloring.

Lakes, Rivers, and Falls. The Continental Divide passes through Yellowstone Park in a jagged line from the southeast to the west boundary. The region south and west of the Divide makes up less than one fourth of the park. It is drained by the Snake River into the Columbia. The Gibbon and the Firehole rivers join to form the Madison. This river and the Gallatin drain the western part of the park into the Missouri River. The eastern part is drained into the Missouri by the Yellowstone River and its branches. All these rivers are clear and cold, and have beautiful falls and rapids.

Yellowstone Lake is the most important body of water in the park. It covers about 139 square miles, is about 300 feet deep, and lies 7,731 feet above sea level. If Mount Washington, the highest of the White Mountains, could be set in Yellowstone Lake with its base at sea level, its peak would be nearly 1,500 feet below the surface of the lake. Yellowstone Lake is one of the highest bodies of water of its size in the world. Only Lake Titicaca in Peru, comparable in size, is higher. The water is clear and cold, and the lake abounds in fish. The cones of a number of hot springs rise above the surface of the lake near the western shore. Shoshone, Lewis, and Heart lakes lie south of the Continental Divide. Beach and Dryad lakes lie west of Yellowstone Lake, and a number of smaller lakes northeast of it.

The Falls and Canyons of the Yellowstone. Many of the dozens of waterfalls in the park are very beautiful. Most important and beautiful of them are the Firehole Falls of the Firehole River, 60 feet high; Gibbon Falls and the Kepler Cascade, each 80 feet high; Osprey Falls, 150 feet; Tower Falls, 132 feet; and the Lower Falls of the Yellowstone, 308 feet high. The Upper Falls of the Yellowstone are 109 feet high. The channel narrows to a width of 80 feet a short distance farther on, and here the river makes another plunge of 308 feet. In its leap the water is dashed into spray which completely hides the lower part of the fall. The narrow gorge gives

full effect to the great height of the fall, and the roar of the water is deafening. Most beautiful of all the wonders of Yellowstone Park is probably the Yellowstone Canyon, a gorge twenty-four miles long and 1,200 feet deep in places. This scene has been photographed, painted by artists, and written about by many writers. But to those who have seen it, no picture or any amount of glowing words can do justice to the beauty of the canyon.

Other Points of Interest in Yellowstone National Park include Golden Gate Canyon and the canyons of the Gardiner and the Gibbon rivers. The Fountain Paint Pot is a pool of boiling clay of different colors. Mud Geyser, in Hayden Valley, is very different from the beautiful scenery around it. Obsidian Cliff is a mountain of glass 165 feet high. Roaring Mountain is a hill near Norris Geyser Basin. Jets of steam shoot from its sides with great force. The remains of petrified forests are in the northeastern and northwestern parts of the park.

Administration of the Park

Yellowstone Park was set aside by Congress in 1872 as "a national park and a pleasuring ground." The park is managed by the National Park Service of the United States Department of the Interior. It is under the direction of the superintendent, who lives in the administration headquarters at Mammoth Hot Springs. Park rangers patrol the park all year to protect the scenery and the wildlife. Everyone entering the park must register any firearms, and leave them at the entrance or have them sealed.

How to See the Park

Excellent roads lead from the park entrances to all the points of interest. The five entrances are at Gardiner on the north, Cody on the east, Snake River on the south, West Yellowstone on the west, and Cooke on the northeast. Automobiles were allowed in the park for the first time in 1915. By 1917 they had taken the place of horses for most transportation. There are hotels at Mammoth Hot Springs, at Upper Geyser Basin, at the foot of Yellowstone Lake, and near the Grand Canyon. Tourist cabins, lodges, and cafeterias are also located at the main points of interest. Buses run into the park and also between the main points of interest. A 150-mile tour of the park may be made in two and a half days. Nearly 800,000 persons toured the park in their own cars during one vacation season, and almost a third of them camped along the way.

More than nine out of every ten square miles of Yellowstone is wilderness. The wilderness regions can be reached only on foot or on horseback. Food supplies must be carried on visits to many parts of the park. The extra effort for these wilderness trail trips is worth while, however, because of the scenic views, the wildlife, and the fine unfishd trout streams.

E.B.R.

See also GEYSER; UNITED STATES OF AMERICA (color plate, Scenic National Parks and Playgrounds [Old Faithful]).

YELLOWSTONE RIVER. This beautiful stream is the largest branch of the Missouri River. The Yellowstone rises in the Shoshone Mountains of northwestern Wyo-

ming and flows north into Yellowstone National Park. Here it widens into Yellowstone Lake, a beautiful stretch of water about twenty miles long and fifteen miles wide. The Yellowstone narrows and plunges over the Great Falls and into the Grand Canyon of the Yellowstone. It then flows northeast across southern Montana and empties into the Missouri River.

The Yellowstone River is 500 miles long, and drains an area of 67,500 square miles. The Bighorn River is its largest branch. Billings and Miles City, Mont., are on the banks of the Yellowstone.

L.D., JR.

See also YELLOWSTONE NATIONAL PARK.

YELLOWTAIL is the name given to three kinds of salt-water fish. One yellowtail is also called the amberjack and white salmon. The second is a snapper, and the third is sometimes called the silver perch.

YELLOW TANG. See FISH (color plate, Tropical Salt-Water Fish).

YELLOWTHROAT is the popular name given to several wood warblers of North America. The three best-known are the *western yellowthroat*, the *Pacific yellowthroat*, and the *Rio Grande yellowthroat*. The western and the Pacific yellowthroats are between four and a half and five inches long. The Rio Grande yellowthroat is about half an inch longer.

The western yellowthroat is olive green with a black "mask" across its eyes, and a yellow breast. It ranges from British Columbia to Arizona and flies to Central America in the winter. It usually makes its nest on the ground. The nest is made of grass or leaves. This bird lays four white eggs with brown and black spots.

The Pacific yellowthroat has a yellow-orange breast and a white band on its head. It ranges from British Columbia to Mexico. The Rio Grande yellowthroat has a bluish-gray patch on the top of its head and is colored olive green with a yellow breast. It lives in the Rio Grande Valley.

L.A.H.A.

See also WARBLER.

Classification. The yellowthroats are in the *Mniotiltidae* family. The western yellowthroat is *Geothlypis trichas occidentalis*. The Pacific yellowthroat is *G. trichas arizela*. The Rio Grande yellowthroat is *Chamaethlypis polioccephala ralphii*.

YELLOW TREFOIL. See SHAMROCK.

YELLOW WARBLER. See BIRD (Foster Parents in the Bird World); WARBLER.

YELLOW WATER BUTTERCUP. See BUTTERCUP.

YEMEN, YEM en, is a kingdom in southwestern Arabia. It lies on the eastern shore of the Red Sea, just north and west of the British protectorate of Aden. Yemen covers about 75,000 square miles. Most of the country is mountainous. High tablelands rise from 8,000 to 10,000 feet above sea level. A series of barren terraces slopes up from the coast to the mountains. Rainfall is light, although Yemen is the rainiest part of Arabia. This area was once known as *Arabia Felix* or *Happy Arabia*.

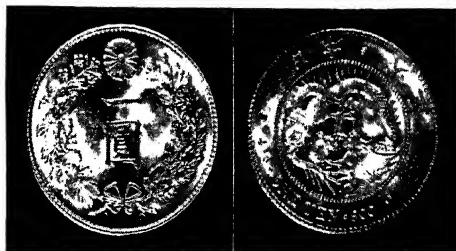
Yemen has a population of about 3,500,000. Coffee growing is the most important occupation. The Mocha coffee of Yemen is world-famous. Some of the people are nomads, or wandering herders of cattle. Others have settled in towns, where they raise barley, wheat, millet, and other crops, sometimes with the aid of irrigation.

Yemen is ruled by an Imam, or Arabian prince. The country has close diplomatic ties with Great Britain. Hodeida (population about 40,000) is Yemen's chief port. The capital is San'a, a trading center. It is a walled fortress city with eight gates, and has a population of more than 20,000.

H.V.B.K., JR.

See also ARABIA (map).

YEN. The yen is the chief unit of Japanese money. Its normal value in United States money is about 23 cents. The yen is the basis of the decimal system of Japanese currency. It is divided into 100 *sen*, each of which is worth 10 *rin*. The Japanese standard of value



Chase National Bank Collection of Moneys of the World
Face (Left) and Reverse Side of the Yen

is the gold yen, but such a coin has not been minted since 1931. Most yen are circulated in the form of paper money.

J. COR.

YENISEI, YEH nee SEH ee, RIVER. This great river drains an area of more than 1,000,000 square miles in Siberia. From the point where the Yenisei rises in the Sayan Mountains of southern Siberia, it travels 2,619 miles to its mouth along the Arctic coast. If the river's length is measured on its longest branch, it reaches a total of 3,553 miles, and is the fourth longest of the rivers of the world.

After the Yenisei leaves the Sayan Mountains, it flows in a general northwesterly direction. It enters the Arctic Ocean through a great divided mouth, or *estuary*, about 200 miles east of the Gulf of Ob. Ocean steamers regularly go 400 miles up the river to the port of Igarka, while river boats almost reach the frontier of Tannu Tuva. The Soviet Government plans to make the river and its tributaries navigable for an even longer distance.

At Krasnoyarsk, where the Trans-Siberian Railway crosses the Yenisei, the river is free from ice over half the year. Timber, gold, and coal graphite are obtained along the Yenisei's banks.

G.B. CR.

See also RIVER (illustration, Longest Rivers of the World).

YEOMAN, YO man. In early England a retainer, or dependent of a feudal lord, was called a yeoman. In the 1400's the name yeoman came to mean English foresters, or small freeholders on a feudal manor. Later the yeomen became an independent class of small landowners and farmers. They were famous for their sturdiness and patriotism. After 1761 the yeomen formed their own volunteer cavalry groups, which were called *yeomanry*.

The Yeomen of the Guard form a group of bodyguards to the king of Great Britain. King Henry VII

first organized this group in 1485. Today the Yeomen still serve as the king's bodyguards on formal occasions. The officers wear modern uniforms, but the men wear colorful costumes and carry weapons which date back to the Tudor period. Their tunics are red and have blue and gold facings, and they wear red knee breeches and flat-topped hats. Years ago the Yeomen of the Guard were nicknamed "beef-eaters." This is an old term applied to servants because they ate their masters' beef. The Yeomen are still sometimes called by this nickname.

The early Yeomen of the Guard were chosen for their fighting ability. But today an appointment to the group is purely honorary. Both officers and men are chosen from Great Britain's regular armed forces. J.S.S.

See also TOWER OF LONDON.

YEOMAN. Men in the United States Navy who do clerical work aboard ship or at shore bases have the rating of yeoman. They are petty officers, rating first, second, and third class, and chief. In World War II, women of the WAVES carried yeoman ratings. R.COL.

YERBA BUENA, *YER bah BWAY nah.* See SAN FRANCISCO (Location, Size, and Description).

YERBA MATÉ, *YER bah MAH tay.* See MATÉ; PARAGUAY (Agriculture).

YERKES, *TUR keez,* **CHARLES TYSON** (1837-1905), was an American financier and promoter. From his large fortune, in 1892 he gave the money for the University of Chicago's Yerkes Observatory. Yerkes was born in Philadelphia. He started in business as a banker and broker and eventually became a director of Philadelphia's streetcar system. In 1881 he moved to Chicago and gained control of the city's streetcar and elevated railway system by methods which were strongly criticized. See also YERKES OBSERVATORY. H.U.F.

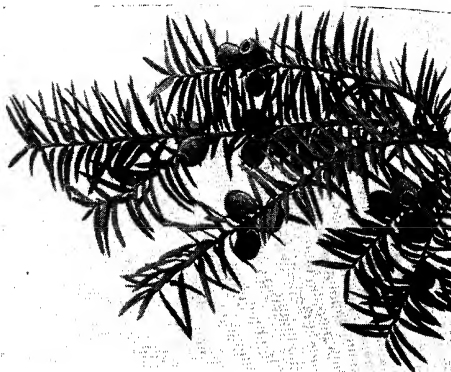
YERKES OBSERVATORY is the astronomical department of the University of Chicago. The observatory is located seventy-five miles north of Chicago, at Williams Bay on Lake Geneva in Wisconsin. It has the largest refracting telescope in the world, with a lens forty inches across and weighing 760 pounds. The telescope is adjusted by delicate electrical devices, and the floor below it may be raised or lowered so the observer can use the eyepiece when the instrument is placed at an angle.

Yerkes Observatory is famous for its work on the distances of the stars by Frank Schlesinger, and its advances in solar physics under the first director, G. E. Hale. It is also well-known for its two magnificent atlases of the Milky Way by E. E. Barnard and F. E. Ross, and for its studies of stellar spectra. The observatory was founded by G. E. Hale with a large donation made by the Chicago traction magnate, Charles T. Yerkes. Since 1932 the Yerkes Observatory has been connected with the W. J. McDonald Observatory of the University of Texas at Fort Davis, Texas. O.S.

See also HALE, GEORGE E.

YERMAK (d. 1584). See SIBERIA (History).

YEW is the name of a group of evergreen trees and shrubs. The leaves of yews are flat, pointed needles, dark green above and pale green beneath. They spread apart in two rows along the stem. The bark is reddish brown and scaly. Yews bear a scarlet berry. Under favorable growing conditions, the trunk of the yew may become very large and the yews may become trees that



New York Botanical Garden

Leaves and Berries of the Yew. Modern archers still consider yew the most nearly perfect wood for making bows.

live and flourish for many hundreds of years.

The *European yew* grows in Europe, Asia, and Africa. There are a great many yews near the English Channel, where the chalky soil seems to help their growth. The famous English archers who defeated the French knights during the wars of the Middle Ages used longbows made of yew wood. Yew trees used to be planted in English churchyards. The branches of the trees were also used for funeral decorations, and twined into wreaths for the heads of mourners. For this reason the yew is often considered a symbol of sadness.

The wood of the yew is tough and elastic, and the grain is almost as beautiful as that of mahogany. In modern times, the yew is polished and made into tables. The heartwood of the yew is a beautiful orange-red in color.

There are several different kinds of yews grown in America. One is the tall *western*, or *Pacific yew*. The wood of this tree is valued for use in cabinetwork and for canoe paddles. The *Japanese yew* grows more in the form of a shrub. The *American yew*, or *ground hemlock*, is a low, straggling shrub. The leaves and branches of the American yew are often used for Christmas decorations. J.T.B.

See also CONE-BEARING TREES.

Classification. The yews belong to the family *Taxaceae*, one of the families of the conifers. The European yew is *Taxus baccata*; the western, *T. brevifolia*; the Japanese, *T. cuspidata*; and the American, *T. canadensis*.

YGGDRASIL, *IG drah sil*, was the great ash tree of Norse mythology. It was called the tree of the world, because its roots spread wide and bound heaven, earth, and the underworld together. Yggdrasil was the tree of life and knowledge. It represented fate, time, and space.

The trunk of Yggdrasil was supposed to hold up the earth. Its evergreen branches hung over the world and reached beyond the heavens. They dripped honeydew upon the gods who met daily beneath them. A magic spring watered each of the tree's three roots. A falcon and an eagle, together with a squirrel and a serpent, lived in the tree. The falcon told what was happening in all three kingdoms of the world. The modern custom

of having a Christmas tree probably grew from the Yggdrasil myth.

See also NIFLHEIM; NORNS.

P.COL.

YIDDISH LANGUAGE AND LITERATURE. Jews in many countries speak and write in the Yiddish language. Yiddish dates from the 1300's. The language grew from High German and has some words from the Hebrew, Polish, Russian, and English languages. The literature is made up mainly of folklore, strange tales, legends, and songs of the Jews in the ghetto. For a time the literature declined, but it was revived after 1880. Major contributions were the tales of Mordkhe Spektor and Yitzkhok Peretz, the poems of Peretz and Simeon S. Frug, the novels of Sholem Abramovitch, and the humorous tales of Sholem Aleichem (Solomon Rabinowitz).

In the United States, Yiddish literature has flourished chiefly since 1900. The main contributions are in journalism. The chief Yiddish poets are probably Morris Rosenfeld, Yehoash Blumgarten, and Abraham Reisen. The leading novelist is Sholem Asch. Outstanding playwrights include Z. Libin (Israel Hurwitz), Jacob Gordin, Leon Kobrin, David Pinsky, and Leiwick Halpern.

R.H.P.

See also HEBREW LANGUAGE AND LITERATURE.

YIMIR, *E mir*. See MYTH (Myths Concerning the Creation of the World [Norse]).

YODEL is a warbling type of singing which is most commonly heard among the Alpine mountaineers of Switzerland and northern Italy. It is also heard in rural areas of the United States. Yodeling is done by changing a normal singing tone to falsetto and back again in quick succession.

R.KEN.

YOHO NATIONAL PARK. See CANADA (Scenic and Recreational National Parks).

YOKOHAMA, *YO koh HAH mah* (population 668,091), is the fifth largest city in Japan. It is one of the country's chief ports. The city lies on the western shore of Tokyo Bay, about eighteen miles south of Tokyo. The industrial suburb of Kawasaki separates Yokohama from Tokyo. Yokohama is the main port of Tokyo and of eastern Japan. The world's largest ocean vessels can use its harbor, which is well protected by a stone and concrete breakwater.

Yokohama lies on a low plain surrounded by fairly high hills. Shipping companies and large trading firms have their offices near the water front. Between the water front and the main business section farther inland are streets lined with curio shops for tourists. The main business section has several department stores and theaters. Most of the Japanese live in crowded buildings along narrow streets surrounding the business districts. Wealthier Japanese and foreign businessmen whose offices are in Yokohama live in pleasant homes on "The Bluff," which is a hill district on the southern outskirts of the city. Here are several good hotels and clubs, as well as the foreign consulates. One of the most attractive parts of the city is the "Bund" along the water front.

Shipping and the import-export trade are Yokohama's chief industries. Shipbuilding and ship repairing are also important. The chief exports include raw silk and silk fabrics, tea, and Japanese lacquered ware and art goods. Imports include woolen and cotton materials,

raw cotton, and sugar. Two railroads connect Yokohama with Tokyo. Yokohama is also on the main Japanese railroad line to the west.

Yokohama was only a tiny fishing settlement in 1854, when Commodore Matthew Perry of the United States Navy signed his agreement with the Japanese which opened up Japan to Western trade. About five years later, foreign traders opened their offices in Yokohama. After that the city grew rapidly. On September 1, 1923, Yokohama was almost completely destroyed in one of the most damaging earthquakes in the world's history. The breakwater was also badly damaged. Over a period of years the city was rebuilt with more modern buildings and wide streets, and the breakwater was repaired.

Yokohama was again largely destroyed during World War II. In the spring of 1945, United States bombers dropped thousands of fire bombs on the city. Only the docks, the water-front area, and a few other buildings were left standing. After the Japanese surrender to the Allied forces in September, 1945, United States troops occupied the city and rebuilding began again. G.B.C.

YOLK, *yolk*. See Egg; Wool (Qualities and Grade of Sheep's Wool).

YOM KIPPUR, *yohm KIP ur*, is the Jewish day of atonement. In the Jewish calendar, it falls on the tenth day of the seventh month, Tishri, and it is observed as a day of fasting and worship. In ancient times, the high priest held a service in the temple in which certain animals were offered as sacrifices. The service was the main event of the day. Modern Jews observe Yom Kippur by fasting, doing no work, and by attending services in the synagogue or temple. The service lasts from sunset on the ninth day until sunset on the tenth day. Yom Kippur is the most important and sacred of Jewish holy days. On this day the devout Jew thinks of his sins, repents, and asks forgiveness from God. The laws about this holy day are found in Leviticus 16; 23:26-32; 25:9; and Numbers 29:7-11. See also ATONEMENT; SCAPEGOAT.

L.C.M.

YONGE, *yung*, **CHARLOTTE MARY** (1823-1901), was an English writer. Her more than 125 volumes include novels, short stories, biographies, religious essays, literary criticisms, histories, and schoolbooks. Her great interest in religion led her to moralize in everything she wrote. She gave most of the profits from her books to the church for schools and missionary work. At Otterbourne, the Hampshire village which was her lifelong home, she was active until her death in the work of the parish church and school.

G.S.B.

Her Works include *The Book of Golden Deeds*; *The Dove in the Eagle's Nest*; *Landmarks of History*; *Cameos of English History*; and *English Church History*.

YONKERS, N.Y. (population 142,598). This manufacturing and residential city lies immediately north of New York City. Elijah G. Otis began the manufacture



Brown Bros.

Charlotte Yonge, English writer of the 1800's

of elevators here in 1854, and this is now a leading industry. Other manufactures of Yonkers include knitted clothing, carpets and textiles, hats, needlework, electrical appliances, machinery, chemicals and drugs, food products, iron and steel products, and various metal and wood products. It is also a shipbuilding center. Yonkers is a part of the Port of New York. It is connected by ferry with New Jersey.

Yonkers is the home of St. Joseph's Seminary, which gives training for the Roman Catholic priesthood. The city has a number of historical homes. Such homes include the *Philipse Manor Hall*, now a state museum, and *Greystone*, the home of Samuel J. Tilden and later of Samuel J. Untermyer.

In 1646 the present site of Yonkers was included in a grant to Adrian Van der Donck. He was known as De Jonkheer (*young nobleman*), and the site was known as De Jonkheer's land, from which came the name of Yonkers. Yonkers was incorporated as a village in 1855 and as a city in 1872. W.E.Y.

YORK. See ENGLAND (Cities).

YORK, Pa. (population 56,712), is the center of trade and industry for one of the richest farming districts in the United States. The city lies in southeastern Pennsylvania, just west of the Susquehanna River. It is about thirty miles southeast of Harrisburg, the state capital. Factories in York produce industrial machinery, equipment for refrigeration and making ice, many kinds of paper, a variety of textile products, cement, lime, candy, and furniture. The city is also one of the leading places in the nation for the making of cigars.

York is the oldest settlement in Pennsylvania west of the Susquehanna River. The original town was laid out in 1741 under the authority of the members of the Penn family, who were the proprietors of the state. The English background of York appears in its name (honoring the Duke of York), and in the names of its streets. These are titles common in England, such as King, Queen, Princess, and Duke.

During the Revolutionary War, York was one of the capitals occupied by the Continental Congress after the British took Philadelphia. The Congress met here from September, 1777, to June, 1778. The Articles of Confederation were accepted by Congress when it was in session at York. York became a borough in 1777, and a city in 1887. The city is the county seat of York County. R.O.H.

YORK is the name of an English royal family which won the crown from the House of Lancaster during the Wars of the Roses. The first important member of this family was Richard, third Duke of York. Richard's mother was descended from the third son of Edward III. Henry VI, who ruled England during Richard's time, was descended from Edward's fourth son. Richard therefore claimed that he had more right to the throne than Henry. His claims were recognized and he was promised the throne when Henry died.

Henry's queen, Margaret of Anjou, wanted her son to be the next king and opposed the arrangements of the House of York. She gathered an army to support the royal House of Lancaster, and her followers often took the red rose for their symbol. The nobles who favored Richard joined the Yorkist party and took the white rose

for their symbol. This conflict came to be called the War of the Roses. It lasted for thirty years.

In 1460 Richard was killed at the Battle of Wakefield. But the following year his son entered London and was crowned king as Edward IV. He was the first king of the House of York. In 1483 Edward died and his young son, Edward V, followed him to the throne. Two months later his uncle, the Duke of Gloucester, imprisoned the boy and seized the throne. Gloucester was crowned as Richard III, and later strengthened his rule by having Edward and his younger brother murdered in the Tower.

Richard III was the last king of the House of York. In 1485 Henry Tudor, a descendant of the House of Lancaster, rose up against Richard and defeated him at Bosworth Field. In the battle Richard was killed. Henry was crowned as Henry VII, the first of the Tudor kings. The following year, in order to strengthen his position, he married the daughter of Edward IV and united the two royal families. A.R., Jr.

See also EDWARD (IV, V); HENRY (VI, VII); LANCASTER; RICHARD (III); WARS OF THE ROSES.

YORK, ALVIN C. (1887-), was one of the greatest American heroes of World War I. He was born in Fentress County, Tennessee, and was brought up on a mountain farm. He enlisted in the army in 1917 and went to France as a sergeant with the 82nd Infantry Division. On October 8, 1918, he singlehandedly killed about twenty Germans with a rifle and pistol and forced 132 others to surrender. Marshal Ferdinand Foch called his deed "the greatest thing accomplished by any private soldier of all the armies of Europe." After the war York's admirers gave him a farm in Tennessee. York asked that money given him by his admirers be used to found the York Foundation to promote the education of mountain children. This was done. T.R.H.

YORK, CAPE, is a mountainous, ice-covered point of land which sticks out into Baffin Bay on the northwest coast of Greenland, at 76° North latitude, well north of the Arctic Circle. Admiral Robert E. Peary used this lonely point in the far north as a base for many of his explorations around the North Pole. Peary's party discovered huge meteorites here. The largest of these, weighing about 100 tons was sent to the Museum of Natural History in New York. A sixty-foot stone and metal monument was erected on the cape in 1932 to honor Peary. L.D., Jr.

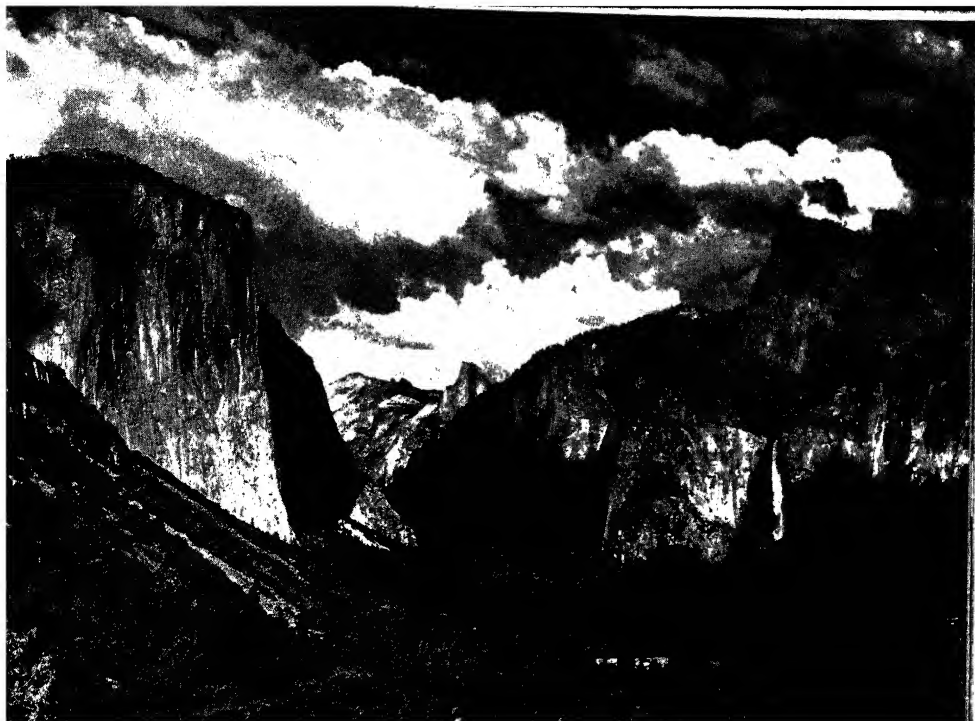
YORK CATHEDRAL. See ENGLAND (The Arts).

YORK RITE. See MASONRY (Masonic Degrees).

YORK RIVER. See VIRGINIA (Rivers and Lakes).

YORKSHIRE TERRIER. See Dog (color plate, Toy Dogs).

YORKTOWN (population 521) is a historic village near the York River in eastern Virginia. It lies sixty-two miles southeast of Richmond, and is connected by a parkway with Williamsburg and Jamestown. In 1781 Lord Cornwallis surrendered to General George Washington at Yorktown in the final British defeat of the Revolutionary War in America. The first customhouse in America was built in Yorktown in 1706, and is still standing. Today the entire area around Yorktown is known as the Colonial National Monument. In 1931 the sesquicentennial celebration of the surrender of Cornwallis to Washington was celebrated at Yorktown.



Ansel

Yosemite National Park Has Long Enchanted Visitors with Its High Mountains and Magnificent Forests

See also **REVOLUTIONARY WAR IN AMERICA** (Final Campaign); **WAR BETWEEN THE STATES** (Principal Battles).

YORKTOWN, SIEGE OF. See **WAR BETWEEN THE STATES** (Principal Battles).

YOSEMITE NATIONAL PARK. "It contains countless lakes and waterfalls and smooth, silky lawns. Here, too, are the noblest forests, the highest granite domes, the deepest ice-carved canyons, and snowy mountains soaring into the sky twelve and thirteen thousand feet." John Muir, the explorer and naturalist used these words to describe the enchanting beauty of famous Yosemite National Park.

Yosemite is a great wilderness covering 756,294.65 acres. The park is in east central California, about 200 miles east of San Francisco. It lies in the very heart of the Sierra Nevada Range, with the jagged peaks of the High Sierra to the east. There are about 700 miles of trails which lead to almost every section of the park. About sixty-five kinds of animals and over 200 varieties of birds live in the forests and on the mountain slopes. Bears and deer are most common, and ducks and flocks of wild geese may be seen flying above the streams. Yosemite has thirty-one kinds of trees and more than 1,300 kinds of flowering plants. There are three groves of giant sequoias. The best known of these is the Mariposa Grove, which lies near the south entrance of the park area.

In 1864 Congress gave the Yosemite Valley to California to be used as a public park and recreation center. Yosemite National Park was established by Congress in October, 1890, but at that time it did not include the Yosemite Valley or the Mariposa Grove. California

gave up these areas and they were added to the national park in 1906.

The Yosemite Valley. The most beautiful scenery in the park is in the Yosemite Valley, which lies in the heart of Yosemite Park. The valley was first seen by a party of settlers who were chasing a band of raiding Indians through the mountains. Suddenly they found themselves in a valley whose beauty was breathtaking. Within the valley, the Merced River has carved a much deeper course than its branches, so that their waters fall from great heights. Then a glacier came, cutting the valley wider, until in some places it was over a mile wide and nearly a mile deep. When the glacier disappeared, the waters of the mountain streams tumbled to the bottom of the valley in lovely falls or cascades. One of these cascades is Vernal Falls, which is 320 feet high. This waterfall is famous for the rainbow colors which sparkle from its flying waters. The Bridalveil Falls drops 620 feet in a column so slender that it disappears in spray. The Yosemite Falls first drops 1,430 feet, then leaps from rock to rock for 715 feet, and finally falls another 320 feet. Ribbon Falls, the highest of all, has an unbroken drop of 1,612 feet.

A number of rocky masses rise sharply from the floor of the canyon. These odd-shaped rocks include El Capitan (Spanish for "the Captain"), Cathedral Rocks, and Half Dome. Yosemite Valley is 4,000 feet above the sea, and the peak called Cloud's Rest rises more than a mile above the valley.

The Hetch Hetchy Valley lies in the northwestern part of the park. The valley was carved out by ancient glaciers. It was second only to Yosemite Valley in its

scenic beauty until the city of San Francisco built a dam at the lower end of the valley. The floor of the valley is now a lake or reservoir, which supplies water to San Francisco. The Grand Canyon of the Toulumne River is east of the Hetch Hetchy Valley. The Toulumne River rushes through the canyon at great speed, and drops 4,000 feet in four miles, creating many waterfalls along the way. The river flows through the Toulumne Meadows near its upper end. The Meadows are a favorite camping place for more than half a million persons who visit Yosemite National Park each year. Near by is Tenaya Lake, the largest of more than 300 lakes in the park.

H.E.K.

See also RIBBON FALLS; UNITED STATES OF AMERICA (color plate, Rivers, Waterfalls, and Lakes).

YOSHIHITO, *YOH shee hee toh* (1879-1926), was emperor of Japan from 1912 until 1926. He followed his father Mutsuhito, or Meiji, who had played a large part in the development of Japan into a modern state. Yoshihito chose the name *Taisho* as the name of his reign. It means *Great Righteousness*. Japanese now speak of him by this title.

Yoshihito was educated in Tokyo. His training was comparatively liberal, and he learned to speak English, French, and German. But he was neither mentally nor physically strong, and he could not take a strong personal part in the government in the way his father had.

In 1900 the emperor married his cousin, Princess Sadako. They had three children. In 1921 severe mental illness forced Yoshihito to give up all his duties. His eldest son, Hirohito, became regent, and followed him as emperor on his death.

H.F. MACN.

YOUNG, BRIGHAM (1801-1877), was a Mormon leader who brought his followers to Utah and formed a colony there. Young became the second president of the Mormon Church, or the Church of Jesus Christ of Latter-day Saints, as it is properly called, after the Mormon prophet Joseph Smith died.

Mormon Convert. Young was born at Whitingham, Vt., into an old colonial family. His father had fought under George Washington in the Revolutionary War, and his grandfather had taken part in the French and Indian War. Young spent the early part of his life on his father's farm. Later he became a house painter and glazier. In 1829 Young and his wife settled in Monroe County, New York, about forty miles from the home of Joseph Smith. In 1830, when Smith published the Book of Mormon and founded the Mormon Church, Young became interested in this new religion. He studied it carefully for two years, and in 1832 joined the church.

His wife died the same year. The following year Young led a band of converts to Kirtland, Ohio, where Smith had established his church. Young's strong will and personality soon made him a leader, and in 1835 he became one of the Twelve Apostles of the Church. A



Brigham Young led the Mormons to Utah.

year later he became President of the Quorum of the Twelve Apostles.

Young was sent throughout the eastern part of the United States to make converts, and became the most successful missionary in the Mormon Church at that time. In 1838 he led the Mormons to their new settlement in Nauvoo, Ill. The next year he was sent to England to continue his work, and remained there until 1841. On his return he continued as a missionary in the East.

Takes Leadership. In 1844, while in Boston, Young heard that a mob had murdered Smith and that the Mormons were being forced out of Nauvoo. He hurried back and immediately took charge of the scattered and frightened Mormons. Without his leadership the church might have broken up, but Young rallied the panic-stricken Mormons and made plans to move the settlement farther west. Smith had intended to move the Church to the Rocky Mountain region, and Young carried out his dream.

In the winter of 1846 the Mormons set out on their long journey. In July of the following year Young and 143 faithful followers arrived in the valley of the Great Salt Lake in Utah. Young left enough men there to begin farming operations and then returned to the Mormon settlement at Winter Quarters, Neb. Here the Mormons formally chose him to follow Smith as President of the Church.

Develops Utah. In 1848 Young returned to Salt Lake Valley with the rest of his followers and established the settlement. Under his direction the Mormons changed the barren desert into a rich and fruitful country. In 1849 the Mormons organized the settlement into the provisional state of Deseret and elected Young governor. They asked Congress to admit Deseret as a state. But instead, in 1850, President Millard Fillmore made it the territory of Utah, and appointed Young governor.

Young had led his followers into the wasteland of the desert so that they could live by themselves. He wanted to avoid the hatred and enmity of outsiders who had forced the Mormons to move so many times before. But here again he was disappointed. In 1848 gold was discovered in California, and settlers flocked to the Far West. The Mormons again had neighbors, and as before, they did not get on well together. The doctrine of polygamy, which allowed a Mormon husband to have more than one wife, made outsiders consider the Mormons immoral. Young himself was known to have had at least seventeen wives. The Federal government openly showed its dislike for Mormonism.

In 1857 President James Buchanan appointed another governor in place of Young, but the Mormon leader refused to give up his office. Buchanan then sent an army under General Albert Johnston to force him out. But the new governor was merely a figurehead, and Young continued to rule the Mormons.

For twenty years more, Young had difficulties with the Federal Government. To the world outside he was the symbol of Mormonism, and in attacking him they attacked the whole movement. When Young died he left an estate of more than \$1,000,000. He was survived by fifty-six children.

E.D.T.

See also LATTER DAY SAINTS, REORGANIZED CHURCH OF; MORMON; SALT LAKE CITY; SMITH, JOSEPH.

YOUNG, CHARLES AUGUSTUS (1834-1908), was an American astronomer. During a total eclipse of the sun in Iowa in 1869, he made the first observation of the spectrum of the corona of the sun. He also determined the rate of rotation of the sun on its axis, and discovered the part of the sun's gaseous shell that is called the *reversing layer*. Young found that disturbances in the sun affect magnetic conditions on the earth.

Young was born in Hanover, N.H., and was educated at Dartmouth College. After he became a professor of natural philosophy and astronomy at Dartmouth in 1866, he began his pioneer studies in the physics of the sun. At Princeton University, to which he was called in 1877, he taught astronomy until 1905. R.K.M.

YOUNG, EDWARD (1683-1765), was an English poet. His poem, "Night Thoughts on Life, Death, and Immortality," a melancholy monument of maxims in blank

verse, was widely translated, and it greatly influenced later poets. Young was born at Upham, in Hampshire, the son of a clergyman, and was graduated from Oxford University. In 1728 he was made a king's chaplain, and two years later became rector of the church at Welwyn in Hertfordshire, where he lived until his death. J.A.V.

His Works include a tragedy *Busiris*; a stage play *Revenge*; and a satire *Love of Fame, the Universal Passion*.

), is a poet and student of mythology. She is probably best known for her imaginative retelling of old Irish folk tales. She was born in Fenagh, County Antrim, Ireland (Eire), and studied at the Royal University. She wanted to continue her studies of mythology at the University of Dublin, but decided to come to America after many of her friends were killed in the Irish Revolution. She later lectured in many American colleges. B.F.

Her Works include *The Wonder-Smith and His Son*; *Celtic Wonder-Tales*; *The Tangle-Coated Horse*; *The Unicorn with Silver Shoes*; and the books of poetry *To the Little Princess and Marzilian* and *Other Poems*.

YOUNG, ELLA FLAGG

(1845-1918), was the first woman to serve as superintendent of schools in any large city of the world. She held this position in Chicago from 1909 to 1915. Her chief contribution as superintendent was to introduce studies of a practical nature, which led later to formal vocational training. Ella Flagg Young was born in Buffalo, N.Y., and studied at the Chicago Normal School and the University

of Chicago. She began teaching in 1862.

E.W.K.N.

YOUNG, LEVI EDGAR (1874-). See UTAH (Arts and Crafts).

YOUNG, MAHONRI MACKINTOSH (1877-). See SCULPTURE (Sculpture of Today); UTAH (Famous Men and Women).

YOUNG, OWEN D. (1874-), is an American lawyer and businessman. He is perhaps best known for his work as chairman of the commission of financial experts which planned the settlement of World War I debts by the "Young Plan" of 1929. Young was born on a farm near Vanhornsaville, N.Y., and studied law at Boston University. He became counsel for the General Electric Company, and in a few years chairman of a board of directors. H.U.F.

YOUNG, STARK. See MISSISSIPPI (Famous Mississippians).

YOUNG, THOMAS (1773-1829). See LIGHT (Nature of Light).

YOUNGBERRY. See BREEDING (Plant Breeding); FRUIT AND FRUITGROWING (table).

YOUNG CHEVALIER. See STUART, CHARLES EDWARD.

YOUNG-HELMHOLTZ THEORY. See COLOR (Color Vision).

YOUNG ITALY. See MAZZINI, GIUSEPPE.

YOUNG MEN'S CHRISTIAN ASSOCIATION is the name of a world-wide fellowship. Its purpose is to give young men a healthy outlook on the meaning of living. The organization emphasizes achievement of this outlook through physical fitness, mental training, religious ideals, fellowship, vocational guidance, and service.

The Association has over 2,000,000 members in sixty-four different countries. Most of the members belong to the 1,412 local associations in the United States and Canada. The majority of these members are under twenty-five years of age. The organization is popularly known by the abbreviation Y.M.C.A. It has international headquarters at Geneva, Switzerland.

Beginnings and Growth. The Y.M.C.A. celebrated its hundredth birthday in 1944. The founder of the Association was a twenty-three year old clerk named George Williams. He worked and lived in the Hitchcock and Rogers drapery house in London, together with the other clerks. Williams and groups of his friends used to meet for prayer and Bible study classes. Finally they formed a Young Men's Missionary Society. Then they decided to set up an organization which would spread the ideas of Christianity.

On June 6, 1844, a group of eleven young men met in George Williams' small room overlooking Saint Paul's Churchyard. They agreed to call their new organization the "Young Men's Christian Association." Their Association grew rapidly. On November 25, 1851, an Association was founded in Montreal, Canada. In the same year, a group of young men in Boston established the first Y.M.C.A. in the United States.

On June 7, 1854, the first convention of the North American Associations met in Buffalo, N.Y. Thirty-seven delegates from nineteen Associations attended the convention. In 1855 the Y.M.C.A. held its first World Conference in Paris. By that time there were 379 Associations in seven different countries, and the total membership had grown to 30,360.



Brown Bros.

Edward Young, English lyric writer of melancholy verse



Brown Bros.

Ella Flagg Young was an American educator.

Y.M.C.A.

In 1869 the New York City Y.M.C.A. erected its own building. Then, for the first time, all the activities of the Association were gathered together under the same roof. These activities dealt with religion, social work, and educational and physical training. Today the value of Y.M.C.A. buildings and funds in the United States and Canada amounts to more than \$282,332,800.

Activities and Program. The Y.M.C.A. has had its greatest development thus far in the United States. There are local Associations in 730 American cities. Throughout the country, the Y.M.C.A. emphasizes service to the community. Living quarters are provided at reasonable rates by many Y.M.C.A.'s. Groups of young people, farmers, workers, and executives benefit alike from the Y.M.C.A. In ninety-three cities Y.M.C.A.'s provide special services to Negroes. Assistance is regularly given to twenty-three army and navy posts. This service is greatly expanded during wartime. The Y.M.C.A. first began its war services during the War between the States. These activities increased with each succeeding war. They reached their fullest development during World War II.

Group activity is the most important part of the Y.M.C.A. program. Such Y.M.C.A. activity centers around clubs, forums, classes, teams, and discussion groups. The organization had 106,045 such groups in Canada and the United States in 1946. Committees and boards are in charge of planning the activities. Most of the group leaders volunteer their services. They direct club activity programs, and lead discussions on job problems, public speaking, and forums on important questions of the day.

In addition to its youth activities, the Y.M.C.A. offers general education programs. Associations conduct formal schools and special training and colleges. In

Y.M.C.A.

1946, 38,843 students were registered in twenty-eight of these Y.M.C.A. schools throughout the United States and Canada. Most of the students work at regular jobs, and can attend school only from two to nine hours a week. Y.M.C.A. college programs include courses in commerce, law, engineering, and liberal arts. Some Associations also conduct trade and business schools. Many of the larger schools grant college degrees.

The Y.M.C.A. employs 4,466 professional workers to direct its activities in the United States and Canada. These persons are highly trained before they are assigned to their work. One of their important jobs is to supervise the organization's great camping projects. More than 540 Associations have camping programs. About 202,780 persons attend these camps yearly. Y.M.C.A. workers also try to find employment for Y.M.C.A. members.

Service during World War II. During World War II, the Y.M.C.A. was one of the most important of the United Service Organizations. More than 450 clubs were maintained for the armed forces of the United Nations. The Y.M.C.A. also organized programs for helping nearly six million prisoners of war of all nations. During the war the Y.M.C.A. raised \$12,642,622 for assistance to war prisoners.

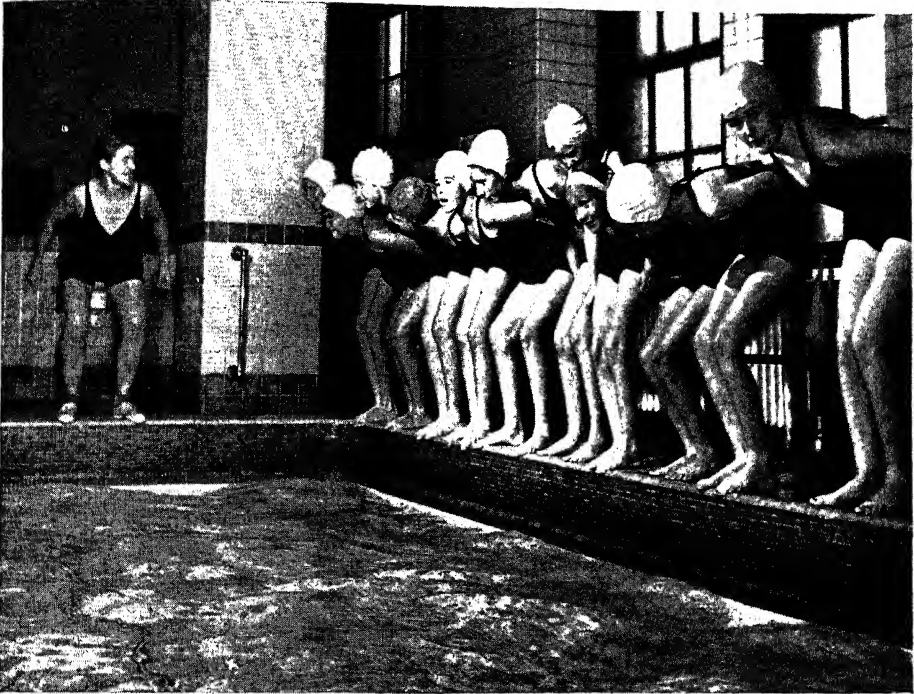
The Y.M.C.A. issues the following publications: *National Council Bulletin* (separately for Canada and the United States); *The Association Forum* (for professional workers); *The Intercollegian* (jointly by Student Divisions of Y.M.C.A., Y.W.C.A., and the Student Volunteer Movement); *Journal of Physical Education*; *Christian Citizenship Service* (for group leaders); and the *Y.M.C.A. Yearbook*. O.E.P.

See also FLAG (color plate, Flags of Organizations); GULICK, LUTHER H.; MOTT, JOHN R.



Manning, Black Star

This Y.M.C.A. Library and Reading Room in a Large City Is a Popular Place for Study and Relaxation



Pinney, Black Star

Swimming Class at the Y.W.C.A. Stay-at-Home Camp, where girls can enjoy a regular program of fun and recreation during the summer months. Swimming, basketball, badminton, and

other games are on the schedule. Members may join classes in handicraft, sewing, pottery making and art, and may go on picnics and hiking trips arranged by the Association.

YOUNG MEN'S HEBREW ASSOCIATION is a name given to certain local organizations in the United States which are affiliated with the National Jewish Welfare Board. The purpose of the Y.M.H.A.'s is to promote the religious and intellectual well-being of American Jews, and to provide programs for the development of Judaism and good citizenship.

YOUNG PEOPLE'S SOCIETY OF CHRISTIAN ENDEAVOR. See CHRISTIAN ENDEAVOR, YOUNG PEOPLE'S SOCIETY OF.

YOUNG PLAN. See WAR DEBT; YOUNG, OWEN D.

YOUNG PRETENDER. See STUART, CHARLES EDWARD.

YOUNGSTOWN, Ohio (population 167,720), is one of the great steel-producing centers of the world. About one tenth of all forms of steel products made in the United States are made in Youngstown. The city lies in the heart of the Mahoning Valley of northeastern Ohio, and the Mahoning River flows through it. Youngstown is about halfway between Cleveland and Pittsburgh, and about sixty-five miles from either city. Youngstown is the seventh largest city in Ohio. Towns lying just outside the city limits include Campbell, Struthers, Girard, and Niles.

Youngstown's park system covers about 2,500 acres and includes well-equipped playgrounds. Mill Creek Park has 2,000 acres of natural valleys and also contains one of the nation's most beautiful golf courses. Among the institutions of the city are the Reuben

McMillan Free Library, Youngstown College, Butler Art Institute, and Stambaugh Auditorium.

In Youngstown there are many smelting furnaces, steel mills, iron foundries, and machine shops. Youngstown also has factories that make rubber goods, fireproof office equipment, leather goods, and cement.

Youngstown was settled in 1796 and named in honor of John Young of New Hampshire, who bought the site of the future city from the Connecticut Land Company. The town was incorporated in 1848, and received a city charter in 1867. .

W.R.MCG.

YOUNG TURKS. See TURKEY (History[Young Turks]).

YOUNG WOMEN'S CHRISTIAN ASSOCIATION. The Young Women's Christian Association is an international Christian Women's movement. Members of the organization believe in the importance of the Christian way of life, not only for individuals but also for society. The organization endeavors to include in its fellowship a representative group of women and girls, business girls, industrial girls, teen-agers, and students, from all races and nationalities.

Educational and recreational activities are carried on by local Associations, many of which also sponsor summer camps. Girls are aided in their search for employment and living quarters. The Public Affairs program especially emphasizes international relations.

There are 434 Y.W.C.A.'s in the cities and towns of the United States, and about 600 student Associations.

Eight International Institutes carry on work among foreign girls. There are 373 registered Y.W.C.A. clubs in small communities.

The Y.W.C.A. was a member of the United Service Organization during World War II. In 1946 the National Board of the organization did war service work in more than 140 communities. The World Emergency work of the Association also brought aid to the suffering peoples of twenty countries.

The Y.W.C.A. of the United States is a member of the World's Y.W.C.A. Sixty-nine countries are represented in the world organization. The international Y.W.C.A. has headquarters at Geneva, Switzerland.

Beginning and Growth. A group of London women organized a young women's association in 1855. Their purpose was to find housing for the nurses who had returned from the Crimean War. At about the same time, another woman's group in London was organizing prayer circles. These two groups soon united and became known as the Young Women's Christian Association. They devoted themselves to meeting the needs of women and girls in all walks of life.

The London Association movement soon spread to the United States. The first United States organization of this type was founded in New York City in 1858. It was known as the Ladies' Christian Association. The first Y.W.C.A. in the United States was organized in Boston in 1866. From these beginnings, the movement grew rapidly, especially in industrial cities. Later the work was taken up in colleges and universities. The first student Y.W.C.A. was founded in Normal, Ill., in 1873. National organizations arose in the Middle West and in the East. In 1906 these national organizations united as the Young Women's Christian Associations of the United States of America.

The Y.W.C.A. in the United States has always been interested in the lives of women in other lands. In 1893 the first Y.W.C.A. secretary in foreign service was sent to India. This work has continued and expanded. Its object is to develop women as Christian leaders in countries throughout the world. M.S.S.

See also FLAG (color plate, Flags of Organizations); GIRL RESERVES.

YOUNG WOMEN'S HEBREW ASSOCIATION. At one time various local organizations of young Jewish women were known as Young Women's Hebrew Associations. There are now no separate organizations by this name. Some of the associations have combined with Young Men's Hebrew Associations and are known as Y.M. and Y.W.H.A.'s. Others have become part of Jewish community centers. All of the local groups belong to the National Jewish Welfare Board. The purpose of the local organizations is to further the well-being of American Jews, and to promote world citizenship.

YOUTH. See ADOLESCENCE.

YOUTH, ALLIED. See ALLIED YOUTH.

YOUTH CONGRESS, AMERICAN. The American Youth Congress was a nonprofit educational association. It worked to assist young persons throughout the United States. The Congress sponsored laws to improve health and employment conditions for young workers. Special commissions of the Congress studied problems of civil liberties, housing, and recreation.

At one time, the Congress had over 4,500,000 members, organized into more than sixty member organizations. These included church groups, Y.M.C.A. and Y.W.C.A. clubs, political clubs, and many other types of youth groups. There is no official record of the group's activities after 1941.

YOUTH HOSTEL. Youth hostels are overnight lodging places constructed for members of the Youth Hostel Association. The Association encourages inexpensive travel as a means of recreation and exercise. Members may bicycle, hike, ride horseback, or canoe from one hostel to another. Automobile travel between hostels is not allowed. Hostels are usually located about ten or fifteen miles apart.

Hostels are found in most parts of the United States, Canada, South America, and Europe. There are many special loops or circuits of hostels in the United States for tours of such scenic districts of the country as New England, the Great Lakes region, the Rocky Mountains, and the Pacific Coast. Other hostels are situated so that members can travel for months at a time throughout the Americas and foreign countries.

Each hostel is supervised by *hostel parents* who provide sleeping quarters and food at a low cost. Hostels are usually equipped with a common kitchen, a dining room, and recreation room. The length of time any one can stay at one hostel is usually three days.

Youth hostels were originated by Richard Schirrmann, a German schoolteacher of Altena, Germany, in 1910. He founded several hostels in the state of Westfalen, Germany. His idea was to encourage people to spend more of their time outdoors. The plan became popular and quickly spread to most of the countries on the continent of Europe and to the British Isles.

Youth hostels were introduced in America in Northfield, Mass., in 1935. The American founders were



Coro, Black Star

Members of the Youth Hostel Association prepare to leave a hostel and begin another stage of their cycle trip.

YOUTH MOVEMENT

Isabel and Monroe Smith, who had attended the International Conference of Youth Hostels in Europe in 1933. The Youth Hostel Association in America is financed largely by contributions from friends of the movement. Its headquarters are in Northfield, Mass. B.S.M.

YOUTH MOVEMENT. In the years following World War I, organized groups of young people began to seek political influence through various planned and organized campaigns known as *Youth Movements*. In Europe such organizations were often directed by Fascist and Communist governments. Some of these groups attained considerable power, but today most of them have disappeared.

YPRES. See **BELGIUM** (Cities).

YPSILANTI, *ip* see **LAHN** *tee*, **ALEXANDER** (1792-1828). See **GREECE** (Turkish Rule).

YSAYE, *ee ZAH yeh*, **EUGÈNE** (1858-1931), was a Belgian violinist and composer. Most of his works are for the violin.

YSER, *ee ZAIR*, **RIVER.** See **BELGIUM** (Rivers).

Y TEENS. See **GIRL RESERVES**.

YTTERBIUM, *ih TUR bih um*. See **ELEMENT, CHEMICAL** (Tables of the Elements and Their Discoverers).

YTTRIUM, *IT ri h um*. See **ELEMENT, CHEMICAL** (Table of the Elements and Their Discoverers).

YUAN, *yoo AHN*. The yuan is the basic unit of currency in China. It is worth 100 *chien*, or cents, in the decimal system of money used by the Chinese. The yuan was established in 1914. Originally it was a silver coin that contained 23.4934 grams of pure silver, but it is now mostly circulated as paper money having little silver backing. The yuan was worth about 30 cents in United States money during the period of its greatest stabilization in the 1930's. J.COS.

YÜAN SHIH-K'AI, *yoo AHN SHEKY* (1859-1916), was a Chinese statesman. He was born at Anyang in Honan Province, and received a good Chinese classical education. He became a favorite of the Chinese political leader Li Hung-chang, who sent him in 1882 to Korea as the Chinese Resident there. Yüan remained in Korea until the Chinese-Japanese War broke out in 1894.

After Yüan returned from Korea, he played a large part in the reorganization of the Chinese army and navy. In 1909, after the death of Emperor Kwang Hsü, Yüan was forced to retire. But when the revolution broke out in 1911, Yüan was called back to head the emperor's forces. A few weeks later he became Premier. He then switched to the side of the revolutionists, and followed Sun Yat-sen as revolutionary chief executive. He became Provisional President of the new Chinese Republic on February 15, 1912.

As President, Yüan faced enormous tasks. He began to centralize the power of the government and he reorganized the army. He also borrowed some \$125,000,000 in



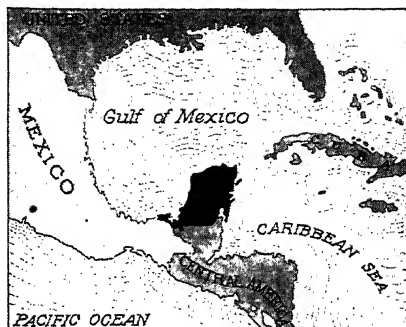
Yüan Shih-k'ai, a leader in the Chinese revolution

YUCATÁN

Europe and America to finance his government. But Yüan did not like the republican form of government. Japanese demands on China during the early days of World War I alarmed the Chinese, and many thought a monarchy would make the country more stable. So in 1915, Yüan had himself elected emperor. The Japanese, British, and Russians advised him to delay, but he chose January 1, 1916, as the date for his enthronement. This date was postponed because of revolts and by the action of several provinces in declaring their independence. Finally on March 1, 1916, Yüan announced that he would not become emperor. There were many rumors that Yüan's death a few months later was caused by poisoning. R.W.MG.

See also **SUN YAT-SEN**.

YUCATÁN, *yoo kah T.AHN*, is a peninsula which makes up the extreme southeastern part of Mexico. The



Location Map of Yucatán (Shown in Black)

peninsula also includes a strip of northern Guatemala and British Honduras. The point of land lies between the Gulf of Mexico and the Caribbean Sea. Yucatán was the last home of the early Maya Indians. The peninsula is famous for its ruins of Mayan cities and for its vast fields of henequen.

The Land and Its Resources. The peninsula is a low, rolling tableland of coral and limestone, covered with a layer of thin soil. Coral is still being formed in shallow seas along the coasts. For the boundaries of Yucatán, see **MEXICO** (colored map).

Mexican Yucatán covers an area of more than 63,000 square miles. It is almost as large as the state of Missouri. The northern part of the region is taken up by the state of Yucatán. This Mexican state covers 23,926 square miles and has a population of 418,210. It is the most densely settled part of Mexican Yucatán. The Mexican state of Campeche lies south and west of the state of Yucatán, and has its coast on the Gulf of Campeche. It covers an area of 19,670 square miles, and has a population of 90,460. This territory is so wild and thinly settled that it has never become a state. Quintana Roo, another Mexican state, covers an area of 19,438 square miles, and has a population of 18,752.

Yucatán has a hot climate, and is dry and dusty during part of the year. But ocean winds keep the temperature from becoming extremely high. Summer is the rainy season, but the rains last for only a few weeks. The porous limestone of the peninsula catches and holds

YUCATÁN

the rain water. Deep pools are often formed in underground caves. But there is so little rain that Yucatán has very few streams. Most of the peninsula is covered with thick, low, tropical jungle. Along the coasts there are forests of logwood, mahogany, and other valuable hardwood trees.

The People and Their Work. Most of the people of the Yucatán are descended from the Maya Indians who lived there many years ago. The present-day Mayas call themselves Yucatecos. They are short and stocky, with broad heads and reddish-brown skins. The Mayas no longer worship the nature gods of their ancestors. Most of them are Roman Catholics. But in many ways their life is much as it was in the 1300's, when early Spanish explorers first discovered this land. The people live in small huts with palm-thatched roofs and walls made of poles laced together with liana vine. Their floors are the ground, and their beds are hammocks. Most of the Mayas use the same simple farming methods that their ancestors used.

Before the 1920's, most of the people worked on the great henequen plantations. But various land reforms were put into effect from 1911 to 1918, and today many of the great plantations have been broken up into small farms. Raising henequen is less profitable than it used to be, and Yucatán no longer has a monopoly on the world's supply. But this hardy plant fiber is still the chief crop of the peninsula. The great blue-green leaves of the plant take their moisture from the air and thrive on the thin soil. Other important products of Yucatán include cacao, chicle, corn, sugar cane, tobacco, cotton, and coffee.

Yucatán has been slow to develop systems of communication. The location of the peninsula makes it easier to reach the region by plane or boat than by land. There are few roads and fewer railroads. The chief cities are Mérida (population 98,636), the capital of Yucatán province; Campeche (population 20,125), the capital of the state of Campeche; and Progreso (population 11,481), the peninsula's chief port.

History. The Maya Indians built their great cities in Yucatán hundreds of years before the Spaniards came. (See MAYA.) The most famous of these ancient cities is Chichen-Itzá, and Mérida. But other magnificent ruins of cities and buildings are scattered throughout Yucatán. For some unknown reason, the ancient Mayas abandoned their cities. The beautiful limestone buildings fell into ruins and the green of jungle plant life covered them.

The first Spaniard to come to Yucatán was Francis Fernández de Córdoba, who sailed along the coast in 1517. Hernando Cortes crossed the peninsula in 1525. By 1542 Francisco de Montejo the Younger had set up Spanish rule over half of Yucatán, and had established the cities of Campeche and Mérida. Some of the Indians became slave laborers on Spanish henequen plantations. Others hid from the Spaniards in the wild regions of the peninsula. To this day, the Indians in part of Yucatán have never been completely conquered.

During the 1800's and 1900's the Maya Indians revolted several times against the Mexican Government. In 1911 a governor named Salvador Alvarado came to power and brought Yucatán a new kind of government.

YUCCA HOUSE MONUMENT

For the first time, the government built schools and encouraged the people to grow crops for their own use. The Indian children were taught the proud history of their people. Many of the large estates were divided in order to give land to each Indian village. In 1922 Alvarado lost the governorship to Felipe Carrillo, who carried on many of the reforms of his predecessor until the time of his death, in 1924. Since Carrillo's death, various social and governmental reforms have taken place in Yucatán, in common with the countries which share the control of the peninsula. I.J.C.

See also MEXICO (Cities [Mérida]).

YUCATÁN CHANNEL. See MEXICO, GULF OF.

YUCCA is the name of a genus, or group, of interesting shrubs or trees of the lily family. The yucca plant has a very striking appearance. It is an evergreen plant, which means that it does not shed its leaves each year. There are many varieties of the yucca plant.

Some yucca plants have very short stems and some have tall trunks that are woody and scaly. The leaves of the yucca plants are usually pointed, stiff, and narrow with sawlike or fibrous edges. The leaves grow along the stem or in clusters at the end of a stem. The yucca plant has beautiful flowers that are shaped somewhat like bells. Certain varieties of the yucca have whitish-green flowers, while others have white or cream-colored flowers. These flowers are borne in a cluster on a stem which springs up from the center of a cluster of leaves. Some of these flowers give off a strong fragrance when they open at night. The fruits of the yucca are large and may either be fleshy or dry. They contain many small, flat, black seeds.

The greatest number of yuccas grow in the southern and southwestern parts of the United States. They are also found in the desert highlands and plateaus of Mexico. Most of the species of the yucca are low shrubs. But in our deserts, and in Mexico, there are several species that become large, picturesque trees. The Joshua Tree National Monument in California contains important collections of yucca trees. The Adam's needle is sometimes grown in northern gardens.

In times past yuccas were useful plants to the Indians. The fibers from the leaves were used to make rope, sandals, mats, and baskets. The buds and flowers were used as food, and were eaten raw or boiled. The fleshy fruits were eaten raw or roasted. They were often dried for use in the winter and were used to make a fermented drink. The roots and stems of the yucca are still used to make a valuable kind of soap. Some kinds of yucca are known as soapweed.

Yuccas are often planted as decorative plants in gardens throughout the United States. They are sometimes grown as border plants. E.C.J.

See also FLOWER (color plate, Desert Flowers); PLANT (color plate, Some Members of the Lily Family); SPANISH BAYONET.

Classification. Yuccas belong to the family *Liliaceae*. The common yucca tree or Joshua tree is known as *Yucca brevifolia*. Another common species of yucca is the *Y. baccata*, which is found in great numbers in the dry areas of the United States and Mexico. *Y. glauca* is found from New Mexico to the Dakotas.

YUCCA, YUK ah, HOUSE MONUMENT. See NATIONAL MONUMENT.

YUGOSLAVIA



John Strohmelt Wolff, Black Star

YUGOSLAVIA, *TOO goh SLAH vuh ah*, is the northernmost of the Balkan states. The different civilizations and cultures of the East and the West probably meet more sharply in Yugoslavia than anywhere else in Europe. Most of what is now Yugoslavia was ruled for hundreds of years by the Ottoman Turks. Even today the effects of Turkish rule can be seen throughout Yugoslavia in the customs and religion of the people, and in the Turkish architecture of the buildings. Ruins of older buildings date from early Christian times, and from still earlier periods.

The country is backward and primitive compared with its neighbors to the north and west. Its mountain villages are like communities of the Middle Ages. Its people are only beginning to know and understand the ways of life that are common today in other parts of Europe.

Yugoslavia is the homeland of the Yugoslavs, or South Slavs. The word *Yugoslavia* means *State of the South Slavs*. From 1918 to 1929 the country was known as the Kingdom of the Serbs, Croats, and Slovenes. The united country was established as a kingdom after World War I. At that time the kingdoms of Serbia and Montenegro were united with several parts of the crumbling Austro-Hungarian Empire to form present-day Yugoslavia.

The Land and Its Resources

Extent: Area, 95,576 square miles. Greatest length, 565 miles. Greatest width, 260 miles. Coast line, about 1,000 miles along the Adriatic Sea.

Physical Features: Chief mountain ranges, Dinaric Alps, Karavanken Alps, Julian Alps, Velebit, Kara. Chief peaks, Triglav (9,394 feet), Begova (8,300 feet), Mount Juboten (8,235), Kaimakchalan (8,282 feet). Chief rivers, Middle Danube, Nissavak, Sava, Ibar, Drava, Morava, Vardar, Narenta. Chief lakes, Ohrid, Prespa, Scutari. Chief islands, Krk, Brac, Hvar, Korčula.

Location, Size, and Surface Features. Yugoslavia is

a little smaller than the state of Oregon. The Adriatic Sea lies to the west of Yugoslavia. Seven of the countries of Europe form boundaries on the east, north, south, and strips of the western border. For the boundaries of Yugoslavia, see BALKAN PENINSULA (colored map).

The coast line of Yugoslavia is very irregular, and has many bays and inlets. These form excellent natural harbors. Hundreds of islands lie off the coast. A narrow strip of land along the coast has long beaches and wooded hills. This coastal area has been a popular year around resort since Roman times.

Back of the coastal area, western Yugoslavia is made up of rough, heavily-forested mountains, fertile valleys, and a dry, stony plateau called the *Karst*. This western mountain area forms part of the Alpine-Balkan mountain system.

The *Karst* is a stretch of limestone hills and valleys which begins about ten to twenty miles inland and reaches another forty or fifty miles eastward. The climate here is much drier than along the coast, or farther inland in the Pannonian plain. The few streams in the region flow for short distances and then disappear into the porous limestone deposits.

Central Yugoslavia levels off into plains which are drained by rivers that flow into the Danube. This area is known as the Pannonian Basin. It is the most important part of the country. Most of the farms lie in this



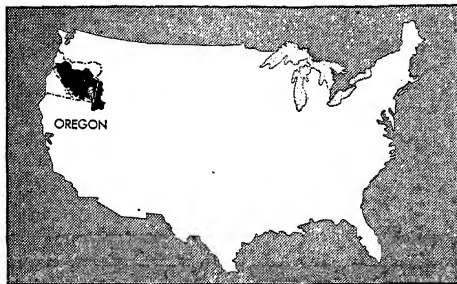
Location Map of Yugoslavia.

Hvar *K'vahr*
Kaimakchalan
KY mahk CHAH lahn
Korčula *KOHR choo lah*
Krk *kurk*

Pronunci

Nissavak *NEE shah vahk*
Ohrid *AHK reed*
Sebenica *SAR bay NE kah*
Triglav *TREE glahv*

plains area, and most of the people of Yugoslavia live here. This central region is part of a great valley between the western mountain ranges and the Transylvanian Alps which lie to the east, in Rumania. It forms the central area of modern Serbia and includes part of ancient Bosnia. The natives call it the *Sumadija*, which



Area of Yugoslavia Compared with That of Oregon. Yugoslavia covers an area of 95,576 square miles. It is slightly smaller than Oregon, which covers 96,981 square miles.

means *forest*. An area of hills and valleys known as the Morava-Vardar Depression lies just south of the *Sumadija*. The central region has both fertile valleys and rough mountains. Southern Yugoslavia is almost all mountains.

Rivers, Lakes, and Bays. Yugoslavia has many rivers and lakes, except in the limestone area of the Karst. The rivers drain into three seas. The Sava River flows 580 miles from northwest to southeast. It empties into the Danube River, which flows into the Black Sea. The shorter Drava and Morava Rivers also flow into the Danube and on to the Black Sea. The Vardar River and its branches empty into the Aegean Sea. The Narenta River and other shorter streams drain into the Adriatic Sea.

The wild mountains of Yugoslavia are dotted with many lakes. There are at least eighty of considerable size. Lake Scutari, in southern Yugoslavia, is the largest. Lake Prespa and near-by Lake Ohrid, also in southern Yugoslavia, are nearly as large. The lakes of Yugoslavia lie deep between wooded mountains, and are famous for their beauty.

Climate. Yugoslavia has three kinds of climate. The climate along the coast is mild and sunny, and much like the climate of Italy. The temperatures here range from 48° F. to 60° Fahrenheit in the winter, and from 55° to 75° F. in the summer. There is much rain in the spring and autumn. The southern part of the coastal area has an average yearly rainfall of sixty-five inches.

The northern interior of the country lies within the Central European climatic zone. It is hot and moist in the summer, and cold and snowy in the winter. The average summer temperature is 75° F., and the average winter temperature is 27° F. The Morava-Vardar Depression has a "continental" or land climate, with hot, dry summers and cold winters.

Natural Resources. Since Yugoslavia became a separate country, its people have made great progress in discovering the country's mineral and natural wealth. Probably Yugoslavia's greatest natural resources are the

rich soil of the central plains area, and the heavy forests that cover the hills and mountains. There are also rich mineral deposits. Coal, iron, lead, zinc, bauxite (the ore from which aluminum is made), and some manganese have been located. Yugoslavia has greater copper deposits than any other country in Europe. Lead, antimony, and chromium ores are also plentiful.

Land suitable for farming makes up more than half (58 per cent) of the total area of the country. About one fourth (23 per cent) of the total farm land is cultivated. Much of the rest of the farmland is poor and yields scanty crops. The limestone soil of the Karst belt is perhaps the poorest soil in Europe.

Conservation. Yugoslavia has always been heavily forested. But during the early 1900's the oak, fir, and beech trees were cut and shipped out of the country at a faster rate than the forests could grow naturally. The new Yugoslav Government did little toward reforestation until 1929. Then a forestry law provided for a planned use of forests under the control of government foresters. Today more than one third of the total area of the country is covered with forests. The Germans cut down some of the forests during the time they occupied the country (from 1941 to 1944). But the heavily forested areas lay in the mountainous regions that the Germans never fully controlled.

Most of Yugoslavia's rivers are in the mountains and form a splendid source of possible water power. For many hundreds of years small farmers have used waterfalls to furnish power for crude waterwheels and grain-grinding mills. Today the country has many electric power-producing plants. But the possible hydroelectric power in Yugoslavia has been scarcely touched.

The People and Their Work

Population: estimated 15,703,000, ranking ninth in Europe. **Density,** 164.3 persons per square mile. **Distribution,** rural, 80 per cent; urban, 20 per cent.

Chief Products: *Agricultural*, wheat, oats, barley, corn, tobacco, sugar, cattle, pigs, horses, poultry, oranges, plums. *Mineral*, coal, lead, iron, bauxite, gold, chrome, antimony, cement, copper, manganese. *Manufactures*, wines, lumber, sugar, textiles.

The People. More than four fifths of the people of Yugoslavia are South Slavs, a branch of the great Slavic people of northern and central Europe. The ancestors of present-day Yugoslavs migrated south over the Carpathian Mountains in early Christian times.

The Slavic peoples of modern Yugoslavia may be divided into three groups, the Serbs, the Croats, and the Slovenes. The Serbs live in the ancient provinces of Serbia, Bosnia, Herzegovina, Montenegro, and the Banat. The Croats live in Croatia, and the Slovenes live in Slovenia. It is hard to tell much difference between these three branches of the Slavic family.

The dialects which the people speak are much alike. The name *Serbo-Croatian* refers to the language of both the Serbs and the Croats. These two languages sound about the same, but they are written in different alphabets.

Before 1941 the Germans were the largest minority group in Yugoslavia. The Germans made up about one twentieth of the population in 1941, but many were deported to Germany at the close of World War II.



A Woman of Dalmatia keeps her hands busy spinning wool from a distaff, as she rides her donkey to market.



A Woman of Bosnia works at her embroidery frame. The Yugoslavs are famous for their lovely needlework.



Market Day in a Yugoslav Village means great trading and social activity in the crowded, busy town square.



A Bearded Montenegrin Peasant in the native costume of his region poses proudly before his stone house.

Photos: De Cou, Ewing Galloway; Sawders; Hosmer, Pix

There are many Magyars in Croatia and along the Hungarian frontier. The Magyars have always complained that the Yugoslavs treated them unfairly. They have felt that under Yugoslav rule they did not receive equal rights in the civil service or in the army.

There have been nationality disputes among the Yugoslavs themselves. The four and a half million Croats have felt that the seven million Serbs regarded the Croats as an inferior minority. The Croats complain that the Serbs use their larger numbers to take too many of the government offices and privileges.

At times since Yugoslavia became a separate country, this feeling has become very bitter. The Serbs are Greek Catholics, while the Croats and Slovenes are Roman Catholics. This religious difference has added to the nationality disputes. Ancient hatreds and deep-rooted cultural differences help keep these disputes alive.

Yugoslavia also has small numbers of Albanians, Rumanians, and Turks. Generally, these minorities have not been happy about the treatment they have received from the government. After World War II, the Communist government of Marshal Tito made promises to improve the treatment of minority groups.

Agriculture. About four out of every five Yugoslavs make their living directly from the land. The amount of land suitable for farming is not large, and the farm population is extremely crowded.

The crops of the country vary considerably from region to region because of the differences in soil, altitude, and climate. The chief agricultural products are wheat, oats, barley, and corn. Wine grapes are an important crop, and form the basis for the important wine-making industry. Olives and wild grapes grow thick on the hills of the coastal area and of the islands. Plums are also a profitable fruit crop. Large quantities are harvested to make plum brandy and to dry into prunes. A considerable amount of tobacco is grown in certain sections. Other products include sugar beets, hemp, flax, rye and other grains, hops, potatoes, and fodder crops.

Great numbers of sheep, cattle, horses, and pigs are raised in Yugoslavia. Horses of the finest stock are bred on the Slavonian plains. Goats browse on the mountain slopes throughout the country, and sheep are raised for mutton and wool.

Minerals. Yugoslavia has made great strides in mining since it broke away from Austro-Hungarian rule. Mining production has more than doubled in the years of independence. There were 318 tons of iron mined in 1919. By 1939 this figure had risen to 666,000 tons. In the same period, copper production increased from 16,000 tons to 987,000 tons, and the production of lead and zinc increased from 54,000 tons to 775,000 tons.

The most remarkable development has been in the mining of bauxite. About 1,200 tons were produced in 1919. In 1939, 318,000 tons were produced. Production of the mineral increased during the time of the German occupation.

In 1939 Yugoslavia led all European countries in the production of lead and antimony ores. It was second in the production of copper and chromium ores.

Manufactures. Manufacturing is not very important as yet. Transportation is too poor, fuel too hard to get,

and modern machinery too scarce. Most of Yugoslavia's industry is located in the northwestern part of the country.

Iron and steel are manufactured in Slovenia and Bosnia, and furniture is made in Croatia. The carpet and rug weaving industries are centered in Pirot, near the Bulgarian frontier. The Pirot carpets are made of pure wool, and are dyed with natural colors by secret processes handed down from one generation to the next. The Yugoslav peasants are skilled hand workers, and make many of their clothes and household furnishings.

Transportation and Trade. Yugoslavia has 1,282 miles of navigable rivers. These provide means of freight transportation and travel for much of the country. There are also three long canals connecting navigable rivers. But traveling between the coast and the interior has always been difficult, because of the rugged mountains and the rocky Karst.

The country's railroad system is not well developed. The total railway mileage is only about 6,655 miles. There are railroad lines between all the chief cities, but connection between the coast and the interior is poor. Farm products can be transported only at high cost.

Air travel and transport was growing in the period before 1940. But it was hampered by lack of capital. In 1938 there were only nine airports in the whole country. None of these was built to handle large, modern planes. Development of air lines was seriously interrupted by World War II.

The government put an ambitious road-building plan into operation in the 1930's, but construction has not been rapid. In general, the government roads in the western parts of the country are better than those in the east. Some motorbus lines are in operation.

Communication. In 1919 Yugoslavia had few telegraph, telephone, and postal facilities. The Austro-Hungarian rulers were not eager to encourage progress among their subject peoples. But the kingdom of Yugoslavia gave special attention to this problem and did much to modernize communication systems.

All radio broadcasting stations were placed under government ownership by the Tito dictatorship. But only a few are in operation. In order to keep a receiving set, a person must buy a special license from a government bureau.

Cities. Belgrade (Beograd), the capital of Yugoslavia, and Sarajevo are described under their own names in THE WORLD BOOK ENCYCLOPEDIA. Other important cities of Yugoslavia are described below.

Cetinje, *TSET een yay* (population 6,366), was once the royal capital of Montenegro. The city lies in southern Yugoslavia, about ten miles inland from the Adriatic Sea. It was founded in the 1400's and was many times attacked and conquered by the Turks.

Novi Sad, *NO vee SAHD* (population 63,985), is a railroad center on the left bank of the Danube River at the point where the Alexander Canal flows into the river. The city also serves as a market for the products of the surrounding agricultural region.

The chief buildings of the city include the municipal palace, the Roman Catholic cathedral, and the Serbian Orthodox cathedral. Many Yugoslavs come to the city to visit the palace of the *Matica Srpska*. This was a patriotic organization that led the Serbian national movement early in the 1800's.

YUGOSLAVIA

Skopje, *SKAWP lyeh* (population 68,334), is an important trading center on the Vardar River. The city is so situated that it controls the trade routes to the north, along the Morava Valley, and to the south along the Vardar Valley to the port of Salonika. Only about a hundred years ago most of the population of Skopje was Turkish or Albanian, but the Slavs are now in the majority.

The ruins of an aqueduct built by Emperor Justinian in the 500's can still be seen, and there are many ancient Turkish mosques which are still in good condition. The city also has a Byzantine monastery which dates from the 1100's.

Subotica, *SOO boh tih tsah* (population 100,058), is the center of a fertile agricultural region. It was once part of Hungary, and still has a large Magyar population. Four fifths of the people are Roman Catholics. Subotica is located on the railroad route from Budapest to Belgrade, and is an important trading center.

Zagreb, *ZAH greb* (population 185,581), is the leading financial and trading center of Yugoslavia. It is also a center of Slav culture. Zagreb was the capital of old Croatia-Slavonia, and was a stronghold of the movement for liberation. In October, 1918, the Yugoslav National Council met in Zagreb and demanded an independent Yugoslav state.

The city is beautifully situated in the mountains of Croatia, two miles east of the Sava River, and 141 miles northeast of Fiume. The new part of Zagreb looks like a modern European capital, but the city has many ancient buildings left over from its early days.

Social and Cultural Achievements

Social Conditions. The people live close to the land. Only a small number have any modern city-dwelling standards of living. Few motorcars, paved highways, telephones, and homes lighted by electricity are found outside the large cities.

Fifteen per cent of the peasants own no land at all and have to earn their living as day laborers. Another 50 per cent of the peasants are unable to make a living from their land, and must seek additional work. Farm methods and equipment are simple and crude. Less than half of the farms are even equipped with iron plows.

Education. The Austro-Hungarian government had little interest in educating the subject peoples of what is now Yugoslavia. What schools there were taught the languages and customs of the Austrian and Magyar rulers.

Thus there were Magyar schools in Croatia and Slovenia which a Slav could attend if he were willing to "Magyarize" himself. Similarly, German-speaking schools were maintained in Bosnia and Herzegovina. But the Croat or Slovene who wanted an education in his own language and culture found that the schools were poor and backward. As a result, about one third of the people could not read or write.

When Yugoslavia won its independence the government made a strong effort to improve the whole school system. Many new schools were built, and the number of students going beyond the primary grades increased greatly. Soon there were few persons left in Yugoslavia who did not know how to read and write.

Today children are required by law to attend school for eight years. The children of wealthy and poor parents attend the same schools. Large sums have been spent to improve the rural schools. The work of the universities has been greatly broadened and increased as



Clyde Brown

Children of Yugoslavia carry laundry in wooden bowls balanced on their heads. They stroll beneath spring blossoms on their way to a near-by stream to do the family washing.

a result of the popular demand for higher education.

Libraries. The public and private libraries of Yugoslavia are not large by American standards. But they are important for the treasures of the history of the country which they contain. Many ancient manuscripts, documents, and charters are preserved in the library of the Matica Hrvatska at Zagreb, and at the university library at Belgrade.

Arts and Crafts. Hardly any part of Europe can show a variety in art traditions to compare with that of Yugoslavia. The coastal region has always been greatly influenced by Italy and Italian art. Croatia and Slovenia have been more closely bound to the art and culture of central Europe. Bosnia and the regions which lay so long under Turkish domination still show the effects of this long occupation. Here much of the art is Oriental.

Many Yugoslavs are artists. The work of the weavers, woodcutters, stone carvers, and metal smiths shows a high degree of craftsmanship. Many Yugoslav painters, sculptors, and architects have won world-wide recognition. Probably the best known Yugoslav sculptor was Ivan Meštrović (1883-). His art and dynamic style have influenced many younger painters and sculptors. The effect of his methods has reached to such Western centers of culture as Rome and Paris.

Religion. Most of the people of Serbia and Montenegro believe in the Serbian Orthodox faith. The people of Croatia, Slovenia, and Slavonia are generally Roman Catholic. The religious faiths of Bosnia and Voivodina are more evenly divided. There are many Moslem groups in the southern part of the country. All religions in Yugoslavia are given equal recognition by the government.

YUGOSLAVIA



The Gusle, National Musical Instrument of Yugoslavia

Government

The present Yugoslav Government dates from November 1, 1944, when Premier Ivan Subašić signed an agreement with Marshal Tito, the leader of the Communist forces in the country. Since that time Yugoslavia has been ruled by a Communist dictatorship, with Tito as prime minister and minister of national defense.

The government is strongly centralized and follows the general pattern of a police state. There is no freedom of the speech or press. No opposition to the Tito government is permitted, and there are no free elections.

History

The countries which make up Yugoslavia arose from the wreckage of the Austro-Hungarian Empire at the close of World War I. In 1918, after King Nicholas I of Montenegro had been dethroned, these countries united to form the Kingdom of the Serbs, Croats, and Slovenes. The former kingdom of Serbia was the center and chief member of the new kingdom. The prince regent of Serbia became the head of the new country, as Alexander I.

A constitution was adopted in 1921. It provided for a representative parliament and a constitutional monarchy. Alexander made a sincere effort to rule as a constitutional monarch, but the constant quarrels between Serbs and Montenegrins on one hand and Croats and Slovenes on the other made progressive legislation impossible. Also, until 1924 the new kingdom was engaged in a long, bitter dispute with Italy over possession of the port of Fiume. See FIUME.

YUGOSLAVIA

In 1929 the king dismissed the parliament after a Serb deputy shot and killed several Croat leaders on the floor of the Chamber of Deputies. He declared the constitution null and void, and proclaimed the kingdom an absolute monarchy.

Yugoslavia was made the official name of the country. For administrative reasons the king abolished the seven ancient provinces of the kingdom and redivided the country into nine new districts, or *banovinas*, named for various rivers of the country. The non-Serbs regarded the new government as a scheme to put all the other parts of the kingdom under Serbian rule, and objected violently.

The king issued a new constitution in 1931. This constitution restored some democratic rights to the people, and declared the kingdom a constitutional monarchy again. But it did not allow political parties to operate freely, and it gave new and greater powers to the king.

The king might have finally brought unity out of discord by his personal firmness and political skill. But on October 9, 1934, he was murdered by Croat assassins.

A three-man regency was appointed to rule the country until Alexander's eleven year old son, Peter II, was of age. Prince Paul, a brother of Alexander, was the leading member of the regency, and the real ruler of the country. In 1935 Prince Paul named Dr. Milan Stojadinović the premier. Stojadinović made some effort to reach an agreement with the angry Croat minority, but refused to grant any of their important demands. The Croats then joined forces with the liberal antigovernment Serb leaders. Their strong showing in the elections of December, 1938, forced Stojadinović to resign.

Dragiša Cvetković, the new premier, made an agreement with Vlatko Macek, the Croat leader. By the terms of this agreement Croatia was given its own independent government at Zagreb. Macek was later given the post of vice-premier in the Yugoslav Government.

Political quarrels continued, but the outbreak of war in Europe a week later made local issues seem less important. Yugoslavia was kept busy trying to maintain its neutrality in the midst of warring nations.

Yugoslavia was too close to the center of conflict to be successful in remaining neutral. In October, 1940, Italy invaded Greece from Albania. The Greeks resisted with such vigor that Germany had to come to Italy's aid. Germany demanded the right to send troops and munitions through Yugoslavia. Prince Paul finally gave in to German pressure. On March 25, 1941, a pact was signed which made Yugoslavia an active member of the Axis.

This pact was so unpopular with the people, the army, and the Church, that the country immediately arose in revolt. King Peter declared himself of age and took over the new government. Within a week German troops reached the Yugoslav border and launched a lightning attack on the country. The poorly equipped Yugoslav army was quickly defeated, and surrendered on April 18, 1941. The young king escaped to London, where he established a Yugoslav government-in-exile.

Germany and Italy set up puppet governments in Serbia and Croatia. Parts of Yugoslavia were divided up among Hungary, Italy, and Bulgaria. But the moun-

UNCLASSIFIED

taineers of Serbia and Montenegro refused to be conquered. Under the leadership of a Serbian army officer, General Draža Mihailovich, patriot guerrillas, or *Chetniks*, continued the fight against the Axis powers. The German and Italian armies of occupation and their puppet governments fought back with hideous mass executions.

A split then developed in the patriot forces. Joseph Brozović, a Croat Communist who used the name of Tito, became the leader of a Communist group called the Partisans. The Partisans were soon engaged in open warfare with Mihailovich, who was anti-Communist.

By the winter of 1943-1944 it was clear that Tito was in control of the Yugoslav forces. Mihailovich had been pushed out of the picture. King Peter then decided to name Dr. Ivan Subašić as the new premier. Subašić selected a new cabinet with no members who had openly criticized Tito. But the actual importance of the king declined, because Tito made it plain that he had no intention of restoring Peter to the throne.

In October, 1944, Belgrade fell to combined Soviet and Yugoslav forces. The presence of Soviet troops made Tito's position secure. As soon as his position in the country was firmly established, he made an effort to win over the moderates among his opponents. A general pardon was declared for most of the Chetniks and members of other groups who had fought against Tito. But many who had opposed Tito, including General Mihailovich, were seized and executed.

The victory over Germany left Yugoslavia faced with tremendous problems of reconstruction. Nearly a million Yugoslavs had lost their lives. The devastation and destruction brought about by the long German occupation had almost ruined the economic and cultural life of the country. The question of King Peter was disposed of in a plebescite, or general election, which was held in November, 1945. The people voted against having the king return and approved the so-called "republic." Great Britain and the United States claimed these elections were unfairly held, and granted recognition to the new government only with diplomatic reservations.

In 1948 a split developed between the Communist front in eastern Europe and Tito's Communist regime in Yugoslavia. The Communist Information Bureau, or Cominform, denounced Tito's leadership as "hateful" to the Soviet Union. It accused him of leaning toward the Western powers, and declared that he must return to Soviet policies or give up his position. Tito replied that "Fascist forces" were responsible for this attack. He declared that he would not submit to the dictates of the Soviet Union and other Cominform powers.

Also in 1948, the government seized all privately owned industry remaining in Yugoslavia. S.H.T.

Related Subjects. The reader is also referred to:

BIOGRAPHY

Alexander I	Peter II
Mihailovich, Draža	Tito
Peter I (Serbia)	

CHIEF PRODUCTS

Antimony	Copper
Bauxite	Lead

PHYSICAL FEATURES

Danube River	Sava River
Dinaric Alps	Vardar River

Bosnia and Herzegovina
Chetnik
Croatia and Slavonia
Dalmatia
Dress (Yugoslavia; color plate, Europe)
Flag (color plate, Flags of Europe)

Hungary
Little Entente
Macedonia
Montenegro
Rapallo, Treaties of
Serbia
Slav

Questions

- What does the name *Yugoslavia* mean?
- Where do most of the people of Yugoslavia live?
- Why?
- What are the country's chief mineral resources?
- What are the three main groups of people in Yugoslavia?
- What city is the leading trading center of the country?
- For what arts and crafts are the Yugoslavs famous?
- When and how did the country of Yugoslavia begin?
- Who were the *Chetniks*, and who was their leader?

YUKON. The northwest corner of the Dominion of Canada is a vast, partly arctic region called the Yukon Territory. The territory is a rough triangle which covers an area of 207,076 square miles. The base of the triangle rests on the northern border of British Columbia, and the peak is on the Arctic Ocean. Alaska lies to the west, and the Northwest Territories lie to the east. See CANADA (colored map).



Location Map of the Yukon

The Land and Its Resources. Yukon Territory is almost entirely covered by mountains of the Cordillera range. The Rockies form a part of this range. Between the mountain ranges are many fertile plains and river valleys. The mountains rise to great heights only in the south. There, almost on the Alaskan boundary, is Mount Logan (19,850 feet). This is the tallest peak in Canada. The Rocky Mountains, which lie along the eastern side of the Yukon Territory, are scarcely more than a low range of hills in many places.

The territory gets its name from the Yukon River. The Yukon and its various branches flow through every part of the territory except the southeast corner. This part of the territory is drained by the Liard River.

The climate of the Yukon is very cold. January temperatures average about -20°F. , and the thermometer sometimes falls as low as -70°F. Summers in the Yukon are short, with temperatures averaging between 50° and 60°F. But the days are long, with sometimes as much as twenty hours of sunlight. Hardy vegetables and grain can be grown quickly in the Yukon during the summer.

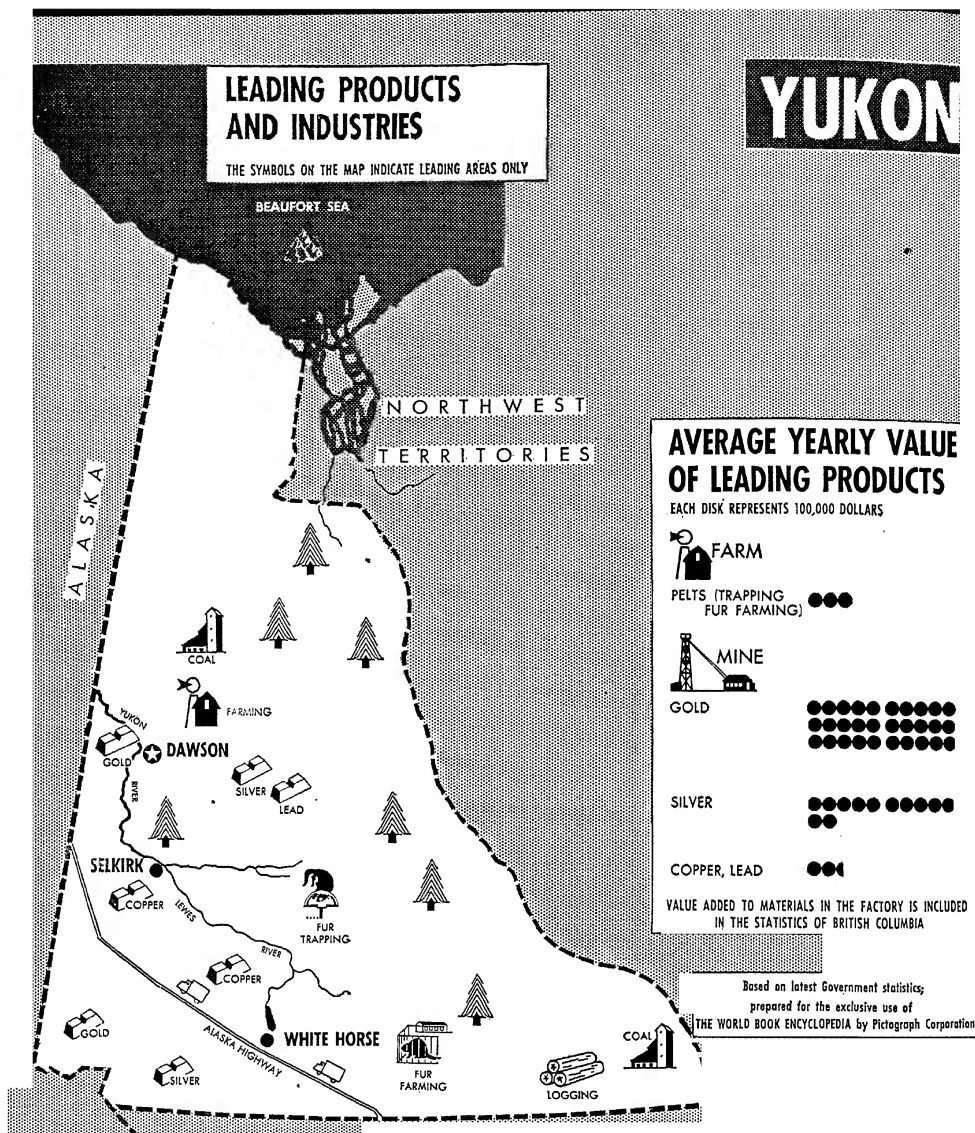
The importance of Yukon Territory can be summed up in one word, gold. But there are also rich deposits of silver, lead, copper, iron, and coal in the Yukon. These minerals have been mined in increasing quantities in recent years. Other natural resources include many fur-bearing animals and vast stands of forest.

The People and Their Work. During the famous Klondike gold rush, the population of the Yukon Terri-

LEADING PRODUCTS AND INDUSTRIES

THE SYMBOLS ON THE MAP INDICATE LEADING AREAS ONLY

YUKON



tory was 27,219 persons. But when the gold near the surface was exhausted, most of these people left. By 1940 the population dropped to only 4,914 persons, including 1,508 Indians.

Eskimos used to live on the shores of the Arctic Ocean in northern Yukon Territory. During the 1930's, however, the Eskimos went east into the Northwest Territories, where the government has established reindeer and caribou herds for Eskimos to tend.

Most of the present-day white population is employed in the mining towns of Dawson (population 1,043), and White Horse (population 754). The mining is now done by huge mechanical dredges which extract the gold, silver, and copper ore from gravel.

History and Government. The region was first explored in the 1840's by Robert Campbell, a British fur trader of the Hudson's Bay Company. The Yukon River Valley remained a part of the company's fur-trading empire until 1870, when it was transferred to Canada as a part of the Northwest Territories.

Prospectors began to visit the region in the 1890's. A detachment of Northwest Mounted Police (now the Royal Canadian Mounted Police) was sent to maintain law and order. But there was little activity in the region until 1897, when the gold rush began along the banks of the Klondike River. An urgent need arose for a separate government over the rough and sometimes lawless miners. In 1898 the Yukon Territory was

YUKON RIVER

created. The town of Dawson was made the capital.

The executive officer of the early territorial government was a commissioner, appointed by the Federal Government. The commissioner was assisted by a territorial council of eleven members. In 1902 Yukon Territory was permitted to send a representative to the Canadian House of Commons.

The peak of gold production in Yukon Territory came in 1900, when \$22,275,000 worth of the precious mineral was mined. After the surface ore had been mined out by simple methods of hand mining, the individual prospectors sold their claims and drifted away.



Yukon Coat of Arms

As the population decreased, there were changes in the government. In 1909 the old council was replaced by one of ten members, all of whom were elected. The council was reduced to three members in 1919. Since 1932 the territory has been under the jurisdiction of a controller instead of a commissioner. In 1946 the reunion of Yukon with the Northwest Territories was being considered by the Dominion government.

Mining is still the principal industry in the Yukon Territory. During a forty-five-year period following the Klondike discoveries, the value of the mineral production of the region was more than \$237,000,000. Gold accounted for \$208,000,000 of this total, and silver accounted for \$21,000,000.

World War II stirred the greatest activity in Yukon Territory since the gold rush. In 1942 the Alaska Highway was constructed. Five hundred and seventy miles of the wilderness road runs through Yukon Territory. The development of the highway was followed by new prospecting tours conducted by various mining companies.

A.L.B.

Related Subjects. The reader is also referred to:

Alaska Highway	Hudson's Bay Company
Canada (color plate, River Klondike	
Boats at White Horse)	Logan, Mount
Dawson	White Horse
Fur Industry	Yukon River
Gold	

YUKON RIVER is the fifth largest waterway in North America, and the greatest river in Alaska and the Canadian territory of Yukon. The river rises in Canadian soil, but two thirds of its course is in Alaska. Its total length, from its mouth to the headwaters of the Lewes, its chief branch, is nearly 2,300 miles. This is as far as the distance between New York City and Albuquerque, N.M., or between Montreal and Calgary. The Yukon drains an area of more than 330,000 square miles. Slightly more than half of this area lies in Alaska.

The Yukon is navigable for almost its entire length. It is traveled by large steamers from its mouth to Dawson in Canada. Smaller vessels travel it between Dawson and Whitehorse Rapids. Above the rapids there is another navigable stretch about 100 miles long. This network of 3,500 miles of navigable waterways



Brown Bros.

Gold Prospectors of the 1890's carried their food and supplies to the "diggings" on long, low dog sledges.

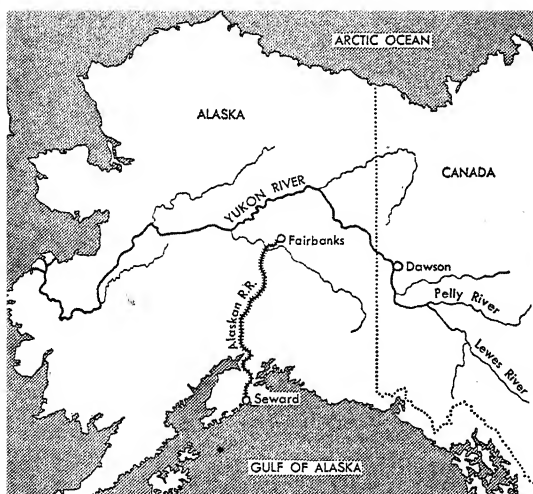
made possible the rapid development of the gold fields during the Klondike rush. The river is still important in transportation through the region, even though frozen for eight or nine months of the year.

The Course of the Yukon. The principal tributary of the Yukon is the Lewes River. The Lewes rises from a series of small lakes in the extreme northwest corner of British Columbia. From this point, the Lewes flows northwest, and joins the Pelly River at Selkirk to form the Yukon proper about fifty miles west of the meeting of the Pelly and the Macmillan rivers. The Yukon then flows in a vast, irregular curve, emptying into the Bering Sea on the west coast of Alaska.

The Yukon Valley may be divided into two divisions—the Upper Yukon and the Lower Yukon.

Upper Yukon. The principal tributaries of the Upper Yukon are the Selwyn, White, Stewart, Klondike, and Forty-Mile rivers. The first important discoveries of gold in this region were made on Forty-Mile Creek in 1895. But these were overshadowed a few years later by the richness of the Klondike field. At the meeting point of the Klondike River and the Yukon is Dawson, the capital of the territory and the largest settlement on the river.

After flowing northwest for 450 miles, the Yukon turns almost at right angles and flows southwest for



Location Map of the Yukon River

200 miles through the famous "Flats." These are level areas of sand bars and low islands, covered with dense thickets of spruce. There the river channel is constantly shifting, and at seasons of high water it increases from a normal width of ten miles to forty, fifty, or even a hundred miles. The "great bend" of the Yukon, where it receives the Porcupine River, is about three miles north of the Arctic Circle.

The "Flats" come to an end at the Ramparts. This is a splendid gorge which extends for 110 miles to the mouth of the Tanana River. In this part the Yukon Valley averages one to three miles in width. The Tanana, which is the Yukon's largest tributary lying entirely in Alaska, flows northwest for about 400 miles, roughly parallel to and about 125 miles west of the Upper Yukon.

Lower Yukon. The Ramparts' gorge ends at the mouth of the Tanana River. The river then enters a lowland fifteen miles or more wide. From this point to the sea, a distance of 800 miles, the valley is never less than two miles wide. The river has created many channels and small islands in this region.

The Yukon delta covers nearly 9,000 square miles. The river has about twenty-five outlets not less than 600 feet wide, and many smaller ones. All of them, however, are shallow and are filled with sand bars. Steamers enter the delta by the arm known as the Aphoon Pass, which is only about four feet deep at low water.

L.D., Jr.

See also RIVER (illustration, Longest Rivers of the World).

YULE, *yool*, is an old name for the Christmas season. The term comes from the Anglo-Saxon word for the months of December and January. The Anglo-Saxons called December "the former Yule," and January "the after Yule." The early pagans of Scandinavian countries held Yule festivals near the end of each year. After Christianity was introduced into Europe, these festivals became Christmas celebrations. The custom of burning a yule log started in pagan times. The early Norsemen honored Thor, their god of war, by burning a yule log with great ceremony during the yule season. E.H.Se.

See also CHRISTMAS.

YUMA, *YOO mah*, Ariz. (population 5,325). This trading center in southwestern Arizona lies on the Colorado River opposite the site of old Fort Yuma, Calif. The rich lands around Yuma are irrigated from the Colorado River. In 1849 a ferry was established here for transporting emigrants across the Colorado River on their way to the California gold fields. The towns site was laid out in 1854 and named Colorado City. The name was later changed to Arizona City, and finally to Yuma, after the Yuma Indian tribe. The first railroad to enter Arizona crossed the Colorado River at Yuma in 1877. The city is the county seat of Yuma County. Irrigated farms in the Gila reclamation project near Yuma were opened to homesteaders in 1947. M.Wins.

YUMA INDIAN. See INDIAN, AMERICAN (Village Dwellers of the Southwest; Table of Tribes).

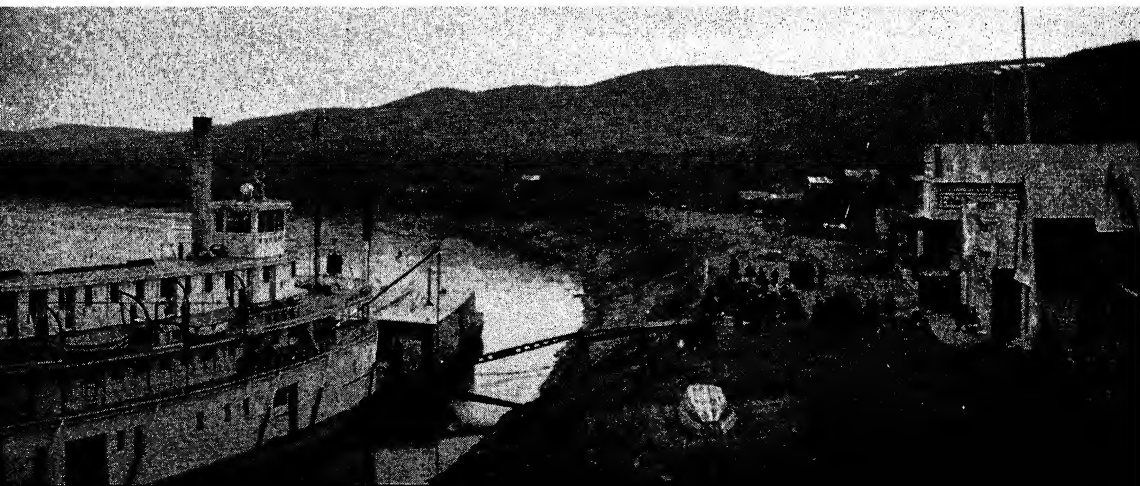
YUMA PROJECT. See IRRIGATION (Irrigation in the United States).

YUMURI, *YOO muh rih*, **VALLEY.** See CUBA (Location, Size, and Surface Features).

YUOK, *YOO rahk*. See INDIAN, AMERICAN (Table of Tribes).

The Waterfront Is the Main Street of Eagle, a Fur-Trading Village on the Banks of the Yukon River in Alaska

De Cou, Ewing Galloway



THE WORLD BOOK ENCYCLOPEDIA



Zz is the twenty-sixth and last letter of our alphabet. It probably came from the letter named *zayin* in the early Semitic alphabet. The Greeks called this letter *zeta*, and gave it the form of the capital *Z* of today. It was the seventh letter of the Greek alphabet. When the

FROM PICTURE TO LETTER

Sinai
1850 B.C.

Phoenician
1200 B.C.

Greek
600 B.C.

Z
Roman
A.D. 114

Romans adopted the alphabet, they did not need this letter, because they did not use the *z* sound in their language. Later, however, the Romans brought the letter back to use in writing Greek words, and placed it at the end of their alphabet. In English, *z* has two main sounds, one as in the word *zone*, and the other the *zh* sound as in the word *azure*. An old name for *z* is *izzard*, which is still commonly used in the expression, "from A to Izzard." See also ALPHABET; PRONUNCIATION.

E.F.D.

ZAEHNSDORF, *TSAINS dohrf*, **JOSEPH** (1816-1886). See BOOKBINDING (Stamping and Decorating).

ZAGREB. See YUGOSLAVIA (Cities).

ZAGROS, *zAH grohs*, **MOUNTAINS**. See IRAN (Location, Size, and Surface Features).

ZAMA, **BATTLE OF**. See SCIPIO AFRICANUS, MAJOR AND MINOR.

ZAMBEZI, *zam BE zih*, or **ZAMBESI, RIVER**. The Zambezi is the fourth largest river of Africa. Only the Nile, the Niger, and the Congo are larger. The great river rises close to the border between the Belgian Congo and Angola, at a height of 3,600 feet above the sea. Then it follows a winding course, separating Northern Rhodesia from Southern Rhodesia, and crossing Mozambique. Finally, it empties into the Mozambique Channel, an arm of the Indian Ocean. The total length of the Zambezi is about 2,200 miles. It has many branches and drains an area of more than 500,000 square miles. The Zambezi Delta alone has an area of hundreds of square miles.

The upper course of the river lies in level land, where the water supply depends on equatorial rains which fall from October to March. From this plateau, the Zambezi flows down to a lower level by plunging over Victoria Falls, a mighty cataract of water greater than Niagara.

The gorge below the falls is crossed by a great bridge, over which the Cape-to-Cairo Route passes. Another bridge, finished in 1935, connects with the road between Nyasaland and Beira, the Portuguese port in Mozambique.

Steamers go up the Zambezi from the sea about 400 miles to the Kebrabasa Rapids. Including stretches of its tributaries, a total of 4,000 miles of the Zambezi are navigable.

Early geographers knew of the Zambezi region, probably through Arab nomads. The first European to explore the upper Zambezi was David Livingstone. He explored the upper Zambezi in 1854 and 1855. The *Livingstone*, launched in 1902, was the first steamer to be placed in service on the river above Victoria Falls.

S.J.S.

See also LIVINGSTONE, DAVID; VICTORIA FALLS.

ZAMBOANGA. See PHILIPPINE ISLANDS (Cities).

ZAMENHOF, *zAH men hohf*, **LAZURUS LUDWIG**. See ESPERANTO.

ZAMIA, *zA mih ah*. See CYCAD.



Ewing Galloway

A Young Chief of the Zambezi Area

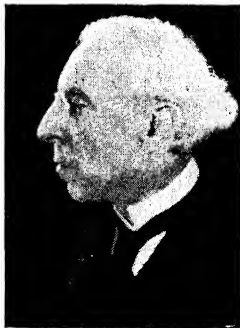
ZAMORA Y TORRES, *thah MOH rah ee TOHR rays*, **NICETO ALCALÁ** (1877-), was the first President of the Spanish Republic. He was born in Priego de Córdoba, and studied at the universities of Granada and Madrid. He began his political career in 1905 and was one of the leaders in the fight to make Spain a republic. He was elected President in 1931 and held office until 1936 when radical members of the Cortes, or parliament, removed him from office. Zamora left Spain during the Spanish civil war. D.E.L.

ZAMPIERI, *tsahm PYAI ree*, **DOMENICO**. See **DOMENICINO**, IL.

ZANE'S TRACE. See **OHIO** (Transportation).

ZANESVILLE, Ohio (population 37,500), is a trading and manufacturing center located on the Muskingum River at the mouth of the Licking River. Zanesville is about sixty miles east of Columbus, the capital of Ohio. Zanesville is especially important for the manufacture of tile and pottery. Art pottery made in Zanesville has long been famous. The city also has factories that make glass products and ironware. Zanesville was settled in 1799 and named in honor of Ebenezer Zane, who was then surveying a road from Wheeling, W.Va., to Maysville, Ky. The town was the state capital from 1810 to 1812. W.R.MoC.

ZANGWILL, *ZANG wil*, **ISRAEL** (1864-1926), was a British novelist and dramatist. He was noted for his sympathetic stories of Jewish life. Probably the most famous of these is his novel *Children of the Ghetto*. Zangwill was born in London and was educated at the Jews' Free School at Spitalfields. Later he was graduated from London University. Zangwill became a short-story writer and edited a humorous magazine, *Ariel*. In 1888 he published a romance, *The Premier and the Painter*, and from that time on continued to write novels and plays. Zangwill became a leader in the Zionist movement. L.J.



Israel Zangwill, author of works on Jewish life

His Works include *The Big Bow Mystery*; *Dreamers of the Ghetto*; and the plays *The Melting Pot* and *Merely Mary Ann*.

ZANZIBAR, *ZAN zih BAHHR*, is the name of a British island and protectorate off the coast of Tanganyika Territory, in southeastern Africa. The protectorate includes the island of Zanzibar, the island of Pemba, and several smaller near-by islands. Zanzibar is famous as the world's chief source of cloves. The name *Zanzibar* comes from two Persian words, *Zangh* and *bar*, which mean *Negro* and *coast*.

The Land and Its Resources. Zanzibar is the largest coral island off the African coasts. It lies in the Indian Ocean and is separated from Tanganyika Territory by a strait only $22\frac{1}{2}$ miles wide. The island covers an area of 640 square miles. Pemba lies 25 miles northeast of Zanzibar. It covers an area of 380 square miles. Both islands are hot, low-lying, and tropical. There are no mineral resources, but the soil of the islands is fertile.



Fenn, Three Lions

A Native Zanzibar Soldier Resting from the March

The People and Their Work. Zanzibar Protectorate has a population of about 250,000 (150,000 on Zanzibar and 100,000 on Pemba). Most of the natives are of mixed Negro stocks. There are also many Arabs and East Indians. Only about 250 Europeans live in Zanzibar. Most of the people are Sunni Moslems.

The chief work of the people of Zanzibar is growing, harvesting, and exporting cloves. Arabs own the large clove plantations, and the natives own many of the smaller farms. The coconut crop is second in importance to the clove crop. Many of the natives make their living by fishing. The chief city of Zanzibar is the capital and port, Zanzibar (population 50,000).

History and Government. The Portuguese founded a trading post on Zanzibar in the early 1500's. Two hundred years later the Muscat Arabs drove the Portuguese from Zanzibar. In 1832 the Arabs made Zanzibar the capital of a large sultanate. Zanzibar became a British protectorate in 1890. The Sultan of Zanzibar is still head of the government in name, but the real ruler of Zanzibar is the British Resident. H.V.B.K., Jr.

ZARA, *ZAHR ah* (population 11,990), is a city on the northwestern coast of Yugoslavia. By the terms of the Treaty of Rapallo in 1920 the city was given to Italy, while the surrounding territory was given to the new Kingdom of Yugoslavia. See **RAPALLO**, **TREATIES OF**.

ZARAGOZA, or **SARAGOSSA**. See **SPAIN** (Cities [Saragossa]).

ZARATHUSTRA, *ZAR ah THOOS trah*. See **ZORASTER**.

ZAUDITU, *zau DE too*, or **JUDITH** (1876-1930). See **ETHIOPIA** (Modern Ethiopia).

ZEALAND, *ZE land*. See **DENMARK** (Location, Size, and Surface Features).

ZEALOT, *ZEL ut*. See **APOSTLE** (Simon the Cananaean).

ZEBEDEE, *ZEB ee dee*. See **APOSTLE** (James; John).

ZEBRA is a striped horselike animal found wild in

Africa. It stands four to five feet high at the withers. Several zebras are called *quaggas*, because of their Hottentot name *quaha*. The zebra is different from all other members of the horse family because of its startling color pattern. Parallel black or dark brown stripes on a whitish background are arranged in exact designs. These stripes run all over their bodies and up and down their faces, meeting diagonally down the sides of the head. The lines may appear even on their long ears, their short thick manes and down their tails to the tuft of hair. The lines help to hide the zebra from its enemies. Some kinds of zebras live on open grassy plains, and some in rough mountains. They live together in small bands, each one of which is led by a stallion. Zebras are savage fighters and extremely wild. If they are captured young and properly trained, however, they can be taught to work in harness. They are sometimes tamed in South Africa because they are apparently immune to the bite of the tsetse fly.

Until a little more than a hundred years ago, great numbers of zebras lived over most of the eastern part of Africa, from southern Egypt to Cape Colony. They were killed for their meat (which is excellent) and for their hides. Some kinds of zebras were killed off and others were much reduced in number.

V.H.C.

See also ANIMAL (color plate, Africa [Grant's Zebra]).

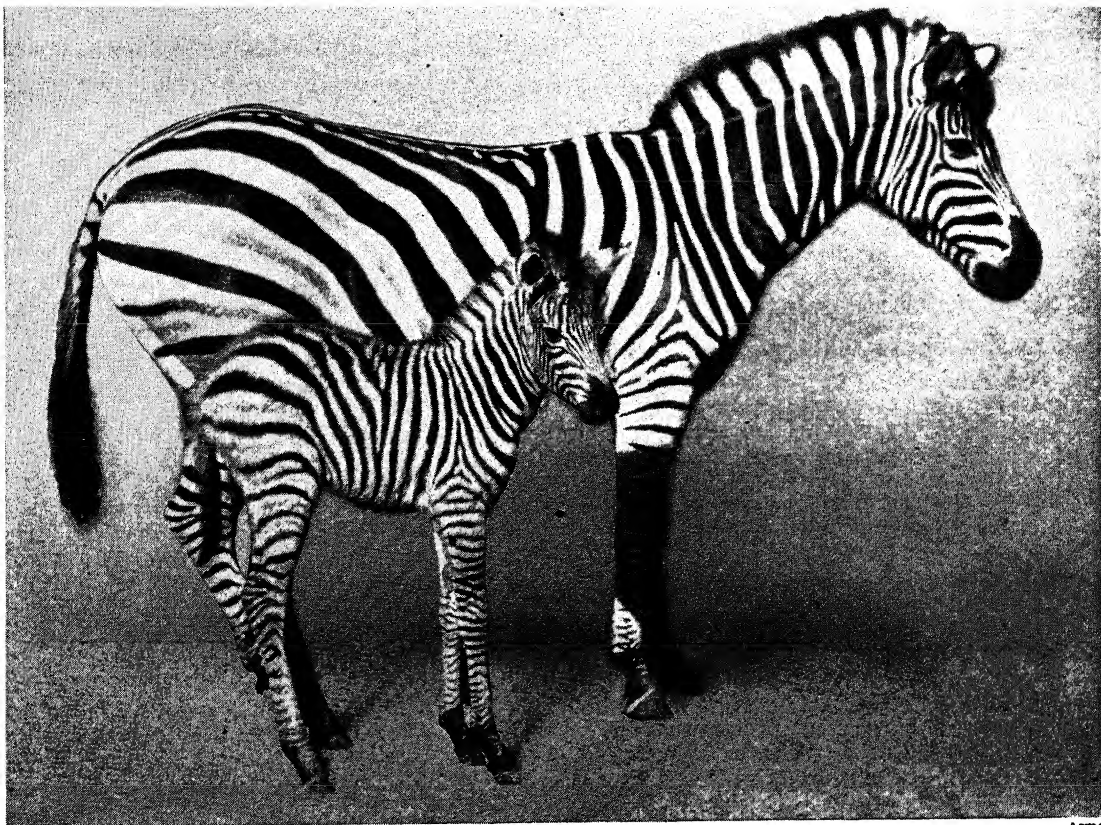
Classification. Zebras belong to the family *Equidae*, or horse. The three species are *Equus zebra*, *E. bontequagga*, and *E. grevyi*.

ZEBRA, or **PAPAW SWALLOWTAIL**. See BUTTERFLY (Kinds of Butterflies); INSECT (color plate, [Papaw]).

ZEBRA WOLF, another name for the Tasmanian wolf. See TASMANIAN WOLF.

ZEBU, *Zebu*, or **BRAHMAN**. This humped domestic cattle of Asia and Africa is probably descended from the banting, the wild ox of southern Asia. It has been domesticated for at least 6,000 years. The most outstanding feature of the zebu is its large fatty hump, or sometimes double hump, on the shoulders. The zebu is different from other cattle because of its rounded forehead, large drooping ears, horns (which may point upward or backward), white legs, and a call which is more of a grunt. The animal can endure extreme heat. It seldom requires shade.

Zebu probably spread from India across Asia and then over most of Africa. Some strains were developed for saddle riding. Others were bred for draft purposes or as pack animals. As a result zebu vary in weight and in size from some which are as big as a large mastiff to



Acme

A Mother Zebra and Her 36-Hour-Old Baby. The zebra's coat is an excellent camouflage. At a distance the animal is

hard to see because its stripes blend with the background of tall grassy plants in their African home.



National Geographic Society

A Powerful Gray Zebu Forms Part of the Team Drawing a Supply Cart for a Scientific Expedition

those as big as a very large ox. The usual colors are white or gray and cream, although red, brown, and black are often seen. Some white bulls are considered sacred by the Hindus. These bulls are allowed to roam about freely eating grain from the fields or bazaars.

Because zebus can resist heat and tropical disease, they have been crossed with other cattle that need these qualities. They had been imported into Jamaica and other areas in the American tropics for use on banana plantations, and have become popular throughout the Gulf States from Florida to Texas. In the United States they are nearly always called Brahmans or Brahma cattle. The white zebu bull is often called a Brahmany bull.

V.H.C.

See also ANIMAL (color plate, India, South Asia, and East Indies).

Classification. Zebus belong to the family *Bovidae*. Their scientific name is *Bos indicus*.

ZEBULUN, *ZEB yoo lun*, was the name of one of the twelve tribes of Israel. Members of the tribe lived in the northern part of Palestine in a district also called Zebulun. Some scholars believe that the tribe originally may have been a Canaanite group which lived there before the Hebrew conquest of Canaan and was later accepted as part of the Israelite nation. The tribe did not take a great part in the history of Israel. Members of the tribe were considered to be descendants of Zebulun, who was the tenth son of Jacob and the sixth son of Leah. Jesus did most of his earlier teaching in the territory of Zebulun and in the neighboring districts of Issachar and Naphthali.

W.A.I.

ZECHARIAH, *ZEK ah RI ah*, was the name of several persons mentioned in the Old Testament. The name means "the Lord remembers." Probably the best-known

Zechariah was the prophet who lived about 520 B.C. The prophet's name is given to the second from the last of the books of the Old Testament, in the English Bible. It is believed that Zechariah was born in Babylon as one of the Jewish captives. But his work was done in Jerusalem. He worked with Haggai in urging the people of Jerusalem to rebuild the temple. He also encouraged the Hebrews to believe that soon they would be a free nation. He likewise preached against the social and religious evils of the times.

Zechariah was a minor prophet, but he was a strong and wise leader of the Hebrews, who were weak during his time. The prophecy of Zechariah is in the first eight chapters of his book. He tells of many visions, which are interpreted by an angel. Biblical authorities doubt whether Zechariah wrote the rest of the book. They believe that it is made up of a group of prophecies from other periods.

W.A.I.

ZEDEKIAH, *ZED ee KI ah*, was the last of the line of David to be king of Judah. His name was first Mattaniah, but it was changed to Zedekiah in 597 B.C., when he was made king by Nebuchadnezzar of Babylon. Later, Zedekiah rebelled against Nebuchadnezzar, expecting help from Egypt in a war against Babylon. But Jerusalem was captured by Nebuchadnezzar in 586 B.C. and all the Jewish leaders were taken prisoner. Zedekiah's eyes were put out and his sons were killed in his presence. He was taken in chains to Babylon where he died.

The name Zedekiah means *The Lord is Righteous*. It was the name of several other persons as well in the Old Testament.

W.A.I.

ZEELAND. See NETHERLANDS, THE (Location, Size, and Surface Features).

ZEIN, *ZE in*. See CORN (Milling Corn).

ZEISLER, *ZYS ler*, **FANNIE BLOOMFIELD** (1863-1927), was one of the foremost of modern pianists. She was born in Bielitz, Austria, but came to Chicago when she was five years old. She already showed ability as a pianist when she was eight years old and later studied in Vienna. For many years she played in concerts throughout the world. G.B.

ZEISS, *tsys*, **CARL** (1816-1888), was a German maker of optical instruments. Zeiss was born in Weimar. In 1846 he opened a small shop in Jena. Twenty years later, Ernst Abbe, a young professor of physics at the University of Jena, used the Zeiss shop to build a new type of microscope. This venture proved successful, and the two men formed a partnership which became world famous for its telescope, photographic and other kinds of optical equipment. J.Cov.

ZELAN, *ZE lan*, is a trade name for a moisture- and stain-resisting finish which is applied to various textiles. Zelan differs from many other such finishes in that it does not cut off circulation of air and does not change the normal texture of the cloth. Zelan does not make the treated fabric waterproof. G.G.De.

ZELAYA, *say LAH yah*, **JOSÉ SANTOS** (1853-1919). See NICARAGUA (History [Internal Unrest]).

ZEMSTVO, *ZEMST voh*. See UNION OF SOVIET SOCIALIST REPUBLICS (Russia's Growing Role in Europe).

ZENANA, *zeh NAH nah*, is the name which the people of India give to the part of a house set aside for women. The word *zenana* comes from the Persian language, and means *belonging to women*. In Bengal the *zenana* is a separate building, and the women who live there never see the outside world. In Turkey a *zenana* is called a *harem* or *seraglio*. See also HAREM; SERAGLIO. W.D.H.

ZEND-AVESTA. See PARSEE; ZOROASTER.

ZENGER, JOHN PETER (1697-1746). See FREEDOM (Democratic Freedom).

ZENITH, *ZE nith*, is a term in astronomy which means the point in the heavens which is directly overhead. The zenith is opposite to the nadir, which is the point directly below. A straight line could be drawn connecting the zenith, the center of the earth, and the nadir. The zenith is used in making certain calculations in astronomy and geography. For example, the location of a star can be computed by determining the distance between the zenith and the star. This distance is called the *zenith distance*. The latitude of a geographic spot can be found by the use of a special telescope called a *zenith telescope*. See also NADIR. O.J.L.

ZENO, *ZE noh*, or **ZENON** (426-491). See ODOACER.

ZENO (about 340-265 B.C.) was a Greek philosopher who founded the Stoic school of philosophy. He was born at Citium, on the island of Cyprus. Zeno was originally a merchant, but lost all his property when he was shipwrecked on his way to Athens. He settled in Athens and took up the study of philosophy. At first he was attracted to the philosophy of the Cynics, who taught indifference. But later Zeno developed a deep belief in self-control, which became the chief principle of Stoicism. In about 310 B.C. he opened his own school, the Painted Porch, and began to teach his new philosophy of self-control and acceptance. See also CYNIC SCHOOL OF PHILOSOPHY; STOIC. B.B.

ZENOBIA, *zee NOH bih ah*, called "The Queen of the East," was the ruler of the ancient Syrian city of Palmyra. She was famous throughout the East for her beauty and strength of character.

Little is known about her early life except that she was the daughter of an Arab chieftain. Zenobia became the wife of Odenathus, king of Palmyra, and on his death in about A.D. 267, became sole ruler. Her husband had been loyal to Rome, but Zenobia wanted to carve an empire out of the Roman possessions in the East. Her adviser, Cassius Longinus encouraged her, and her armies occupied Egypt and other Roman territories.

In A.D. 271 Emperor Aurelian sent an army to stop her advance. He defeated Zenobia at Emesa, and in 272 captured her and brought her to Rome. Zenobia's beauty and dignity so impressed the emperor that he freed her and gave her an estate near Tivoli. She married a Roman and her descendants became prominent figures in Roman society. J.W.Sw.

ZEOLITE, *ZE oh lite*, is the name of a group of minerals which are silicates of aluminum, sodium, and calcium. Some of them also contain potassium. They contain up to 20 per cent water and therefore are classed as *hydrous*. They give off the water easily when heated, and the name zeolite comes from a Greek word meaning *boiling stone*. Zeolites are found in cracks and cavities of rocks such as basalt, gabbro, and granite. They come in crystals of different shapes and their structure is complex. They have a hardness from 3.5 to 5.5.

The most practical use of zeolite is as a water softener. This is a very important commercial use as it is almost impossible for laundries to operate without water softeners. The zeolite exchanges ions to absorb complex organic compounds from solutions, removing almost 100 per cent of the compounds causing hardness. Artificial compounds of zeolite produced in the chemical laboratory are also used in water-softening plants. G.L.Bu.

ZEPHANIAH, *ZEF ah NI ah*, was an ancient Hebrew prophet. His name has been given to the ninth book of the Minor prophets. Zephaniah probably lived and wrote during the rule of Josiah in Judah in the late 600's B.C., but little is known of his life.

The short book has only three chapters not all of which were written by Zephaniah. It prophesied that Judah and several other nations were doomed because their people had done wrong. But the end of the book is more cheerful. It tells of the happy state of those who have been purified by God and reunited with Him. The book is also famous for its description of the coming "Day of the Lord." W.A.I.

ZEPHYR, *ZEF er*, is any warm, gentle western breeze. Zephyrs occur most often in the Temperate Zone during summer. The name comes from the Greek *zophos*, meaning *dark side*, or *west*. E.S.S.

ZEPHYRUS, *ZEF ih rus*. See BOREAS.

ZEPPELIN, *ZEP eh lin*, **FERDINAND, COUNT VON** (1838-1917), was a German pioneer in aerial navigation. His greatest interest was in the dirigibles, or lighter-than-air ships, which were later named for him. He was largely responsible for their successful use by the Germans for bombing attacks during World War I.

Zeppelin was born at Constance, Baden, and was educated to be an army officer. In 1890 he retired from



Ferdinand von Zeppelin became an aviation pioneer after he was sixty years old.

became a daring pioneer in what was largely a young man's field after he was sixty years old. E.Y.

See also DIRIGIBLE.

ZERO, a Japanese plane. See AIRPLANE (Foreign Planes).

ZERO. The ancient system of numerals used by the Arabs and Hindus had only nine elements, the figures 1 to 9. Larger numbers than 9 were written on paper or tablets marked off in columns so that certain spaces could be left blank. For example, the number one hundred and two was written as 1 / 2. The blank spaces represented what is now called *zero*. It was not until the 800's that the Arabs came to use 0 or zero as a symbol for *no thing or no number*. Next to the adoption of Arabic numerals themselves, the taking over of the zero was one of the most important forward steps in the history of mathematics. It made possible calculations which had been impossible before, and led to the greater development of all the higher branches of mathematics.

When zero is added to or subtracted from any number, the result is still the original number. A number multiplied by zero gives zero. Division by zero is impossible. On a horizontal or vertical scale, zero is usually the starting point or neutral position. Positive numbers are usually to the right or above zero, and negative numbers to the left or below. In an automobile, zero on the ammeter is the point at which no current flows into or out of the battery. Zero is registered on the speedometer when the car is standing still. On many scales the fixing of zero is arbitrary, as on a thermometer. On a centigrade thermometer, zero is the temperature at which water freezes, but on a Fahrenheit scale, zero is the temperature at which salt water freezes.

The word zero comes from an old Italian term, *zephirum* or *zepiro*. One of the first to use this term was Leonardo of Pisa, Italy, who wrote a book on the Arabic system of numbers in 1202. He borrowed the word *zero* from the Arabic term *sifr*, meaning cipher, which in turn is a translation of the Hindu word *sunya*, meaning *void or empty*. T.H.H.

ZERO, ABSOLUTE. See HEAT (How Temperature Is Measured).

ZEUS, ZOOS. See JUPITER (in mythology).

ZEUS, STATUE OF. See PHIDIAS; SEVEN WONDERS OF THE ANCIENT WORLD.

the army and turned his attention to the construction of a rigid airship. Zeppelin labored hard to perfect this type of aircraft which earlier inventors had originally designed. His first craft to have even moderate success did not make a successful flight until 1907. But his repeated experiments brought the zeppelin into more successful use and Count von Zeppelin became one of Germany's popular heroes. Zeppelin's career was particularly remarkable in that he became a daring pioneer in what was largely a young

ZEUXIS, ZOOK sis (? -about 390 B.C.), was a Greek painter. He was born at Heraclea, and had a studio in Ephesus. None of his work has survived, but his paintings were said to have been skillfully and realistically done. He is best known for his legendary contest with a rival artist Parrhasius. See also PARRHASIUS. W.ST.

ZHDANOV, ZADAH nauw, ANDREI ALEKSANDROVICH (1896-1948), was a Deputy of the U.S.S.R. Supreme Soviet. He was frequently mentioned as a possible successor to Joseph Stalin, dictator of the Soviet Union. Zhdanov, the son of a school inspector, was born in Mariupol on the Sea of Azov. He was educated at the Moscow Agricultural Institute. When he was nineteen



Sovfoto

Andrei Zhdanov, who aided the spread of world communism after World War II

years old, he joined the Bolsheviks. After the 1917 Revolution, Zhdanov became an organizer and propagandist of the Communist party. He soon gained notice from Stalin and became a key figure in the party machine. Stalin made him secretary of the party in the Leningrad district in 1934. In 1939 Zhdanov was made a full member of the all-powerful Politburo. He became an influential figure in foreign affairs. Zhdanov

directed the attack on Finland in 1939. In 1944, he headed the Finnish Control Commission. He also directed the defense of Leningrad during World War II. After the war, Zhdanov aided in strengthening communism at home and in extending its doctrines to other countries. In 1947, he organized and became chief of the Communist Information Bureau. A.PARR.

ZHUKOV, ZHOO kawf, GRIGORI KONSTANTINOVICH (1895?-), was one of the most distinguished Soviet commanders of World War II. He became Deputy Minister for the Armed Forces and commanded the land forces of the Red Army. Zhukov was born into a peasant family at Strelkovka, in central Russia. During World War I he was a private in the Russian army. In 1918 he became one of the first commanders in the Red Army. Zhukov made his reputation in border fighting with the Japanese in 1938 and 1939 and in the "Winter War" against Finland in 1939 and 1940.

When Germany invaded the Soviet Union in 1941, Zhukov was chief of staff of the Red Army. He organized the defense of Moscow in late 1941 and the Stalingrad victory of 1942 and 1943. He was made a marshal in January, 1943, and led Soviet armies in their westward drive through Poland and Germany. Zhukov commanded



Sovfoto

Marshal Grigori Zhukov led the Red Army into Berlin at the end of World War II.

the Red Army forces which stormed and captured Berlin and on May 7, 1945, together with other Allied officials, he received the final German surrender from Field Marshal Wilhelm Keitel. In the summer of 1946, Zhukov was sent to command troops in Odessa. According to some observers, this was a demotion from his high posts in Berlin and Moscow. But according to others this was no demotion, but rather part of the move to strengthen Soviet forces on the Black Sea and in the Balkans.

A.PARR.

ZHUKOVSKI, zhoo KAWF sku ih, **BASIL** (1783-1852). See RUSSIAN LITERATURE (Eighteenth Century).

ZIEGFELD, ZIG feld, **FLORENZ** (1869-1932), was one of the best-known of modern American theatrical producers. The lavish and colorful spectacles which he made popular were widely imitated by other stage and motion-picture producers. Ziegfeld, the son of the president of the Chicago Musical College, was born in Chicago. He attended high school and began his theatrical career with various enterprises at the Chicago World's Fair of 1893. In 1907 he produced the first of his annual musical shows the *Ziegfeld Follies*. Other productions included *Papa's Wife*; *The Little Duchess*; *The French Maid*; *The Pink Lady*; and *Sally*.

B.M.

ZIGGURAT, ZIG oo rat. See ARCHITECTURE (Babylonian and Assyrian Architecture).

ZIMBALIST, EFREM (1889-), is a well-known violinist. He was born in Rostov-on-Don, Russia, and studied at the Imperial Conservatory in Saint Petersburg (now Leningrad). Zimbalist made his debut in Berlin in 1907, and his first appearance in the United States in 1911. Later he became a United States citizen. In 1941 he was appointed director of the Curtis Institute of Music in Philadelphia.

G.B.

ZINC, zink (chemical symbol, Zn). The bluish-white color of this metallic element fools many people into thinking that it is lead. But zinc is much harder than lead. For example, it is much harder to file than lead. When zinc is heated to a temperature of from 212° to 300° F., it softens and becomes malleable and ductile. That is, it can be pounded into thin sheets or drawn into fine wires. The metal is not affected by dry air. But in moist air, it forms a self-protective coating of tarnish.

Men knew about zinc ores even in ancient times. But the element was not recognized as a metal until 1520, and its practical uses began in the 1800's. Today, most zinc is made in thin slabs called *spelter*.

Zinc is never found in a pure state, but its ores are scattered over nearly all the world. The main ore mineral of zinc is *sphalerite*, or *zinc blende*, a compound of zinc with sulfur. Less important ores are *smithsonite*, a compound of zinc, carbon, and oxygen. *Calamine*, *willemite*, *zincite*, and *franklinite* are other zinc-ore minerals.



National Concert and Artist's Corp.
Efrem Zimbalist, concert violinist and music teacher



The chief mines producing zinc ore are in the United States, Canada, Poland, the Soviet Union, Australia, and Mexico. The metal is mined from great deposits of its ores in limestone and dolomite rock. The deposits of zinc ore may be contained in shallow or deep lodes and veins. The chief zinc-mining districts of the United States are in the Eastern States, in the Mississippi Basin, and in the Rocky Mountain region.

Uses. Large amounts of zinc are used to coat, or *galvanize*, iron and steel and make them rustproof. One of the oldest and simplest methods of galvanizing consists of first cleaning the surface to be galvanized, then dipping it in melted zinc. Electroplating and certain other technical methods are also used in galvanizing. Because sheet zinc (spelter) resists rust, it is used for roofs and gutters, tank linings, weather strips, preserving-jar tops, washboards, and many other articles. There is also a wide use for zinc in making electric dry cells, zinc die castings, and in powder metallurgy. The metal is readily alloyed with copper to form brass, with copper and tin to form bronze, and with copper and nickel to form German silver. It is also used in the process of zinc etching, for making plates used in the reproduction of drawings in printing.

Zinc white, or zinc oxide, a compound of zinc and oxygen, is a white powder. It is widely used to make white paint. This oxide is also used as a filler for rubber for automobile tires and other rubber goods, and in the preparation of cosmetics, enamels, dental cements, and many other articles. Zinc sulfide and lithophone (a mixture of zinc and barium compounds) are other important white zinc pigments.

Zinc sulfate, or white vitriol, occurs in white crystals which change to powder when exposed to the air. It and zinc oxide are used in calico printing and in medicine. *Zinc chloride*, a compound of zinc and chlorine, is a preservative of wood. H.A.Sc.

See also ALLOY; ARKANSAS (Other Minerals); DUCTILITY; GALVANIZED IRON; MALLEABILITY.

ZINC CHLORIDE. See CHLORIDE; ZINC.

ZINC ETCHING. See ETCHING.

ZINCITE. See ZINC.

ZINNIA, *ZIN ih ah*, is the name of a genus of garden plants of the composite family. There are about sixteen species. The zinnias are native to Mexico and the southwestern United States. The best-known zinnia is a garden plant that blooms in a wide variety of colors. It has a stiff, hairy stem which may grow two feet tall. The flowers are in tones of red, yellow, scarlet, crimson, pink, salmon, and bronze. Each floret is stiff and at right angles to the head. Along with the marigolds, this zinnia is the most successful of summer annual flowers. There are three types of this zinnia. One is the large *California Giant*, which grows as high as three feet. Another has golden, starlike flowers. The third is a miniature hybrid. Fantasy zinnias have curled petals.

Zinnias grow well in ordinary garden soil in mild and warm climates. They do best with plenty of sun. They are grown from seed. See also FLOWER (Planting Table for Annual Flowers; color plate, Common Garden Flowers). A.C.Ho.

Classification. The genus *Zinnia* is in the family *Compositae*. The California giant is *Z. elegans*. The starlike flower is *Z. linearis*. The small hybrid is *Z. mexicana*.

ZINZENDORF, NIKOLAUS LUDWIG VON, COUNT (1700-1760). See MORAVIAN.

ZION. The word Zion has many different meanings. Originally, it was the name of a hill in the city of Jerusalem where the royal palace of King David stood and where Solomon later built the Temple. It was the seat of Jewish worship and government. The name Zion is also used to refer to the Israelites themselves. After their exile from the Holy Land, the word Zion meant to them their homeland, with Jerusalem, the Temple, and all Palestine's ancient glory. Among Christians, the name Zion means the church ruled by God, or a heavenly city or heavenly home.

ZIONISM is the name of the movement among modern Jews to set up in their ancient land of Palestine a national Jewish state. The word *Zion* comes from the name of a hill in Jerusalem on which the royal palace of David stood.

In early times the Jews lived in an independent state in the area now known as Palestine. But in 586 B.C. Jerusalem was captured by the Babylonians, and many Jews were driven out of Palestine. The second Jewish commonwealth flourished in Palestine till A.D. 68, when it was destroyed by the Romans. Since that time, Palestine has been ruled by many different invaders and the Jewish people have scattered to all parts of the world. But Jews kept alive the hope of regaining political independence in the land of their forefathers.

Modern Zionism was formally founded by Theodor Herzl of Vienna at an international congress held at Basel, Switzerland, in 1897. Herzl tried to obtain a

charter for a separate Jewish state in Palestine. Turkey ruled Palestine at that time and refused to encourage the Jews. But Zionists did encourage many Jews to move to Palestine. The first new settlers came in 1881 from Russia and Rumania, where they had been victims of the anti-Semitism that raged throughout eastern Europe in the late 1800's and early 1900's. By 1914 the total Jewish population in Palestine had reached approximately 50,000.

In November, 1947, Great Britain issued the Balfour Declaration, named after the foreign minister, Sir Arthur Balfour. The Declaration supported the plan to establish in Palestine a national home for the Jewish people.

In 1922 the League of Nations approved a British mandate over Palestine. The British administration accepted members of the Zionist movement to act as an advisory board. This recognition made it possible for Chaim Weizmann and other Zionist leaders to put into effect the program which they had long wanted. During the first ten years after World War I, numerous agricultural colonies were founded for thousands of Jewish immigrants. The Jewish city, Tel Aviv, grew rapidly. In 1925 the Hebrew University in Jerusalem was opened, and the Hebrew language again became a living speech in the public schools and elsewhere in Palestine. The Zionist movement received help and encouragement from Jews in the United States.

The Nazi persecution of European Jews before and during World War II greatly stimulated the Zionist movement. By the end of the war there were nearly 600,000 Jews in Palestine. Many other Jews who were driven from their homes or placed in concentration camps looked upon a Jewish Palestine as their only possible refuge. Many Jews did not particularly want to settle in Palestine. But they hoped for the setting up of a Jewish national state so that they could once again secure the rights of citizenship they had lost in Europe.

Thousands of Jews tried to enter Palestine illegally. Both the British and the Arabs opposed this movement. Ships carrying illegal immigrants were stopped and the refugees were put into camps in Palestine and Cyprus.

In 1947, the United Nations General Assembly approved the partition of Palestine into separate Jewish and Arab states. A few months later, in May, 1948, Great Britain gave up its mandate over Palestine. The Zionists immediately proclaimed the state of Israel. The boundaries of this new state were those established by the General Assembly. Arab leaders of Palestine and surrounding states bitterly protested the creation of the Jewish state. War broke out between the Arabs and the Jews. Arab Legion fighters entered Palestine from Syria, Lebanon, Egypt, and other Arab states. The United Nations sent Count Folke Bernadotte of Sweden to Palestine as mediator of Jew-Arab differences. In June, 1948, he persuaded the Jews and Arabs to accept a truce. Means were sought to achieve permanent peace in the Holy Land. L.C.M.

See also HADASSAH; HERZL, THEODOR; PALESTINE; SZOLD, HENRIETTA; WEIZMANN, CHAIM.

ZION NATIONAL MONUMENT. See NATIONAL MONUMENT.

ZION NATIONAL PARK. The chief attraction of this national park is Zion Canyon, which has steep walls

that look somewhat like slices of a giant red and white layer cake. Zion National Park covers 94,241.65 acres in southwestern Utah, about thirty miles south of Cedar City and about 130 miles north and west of the Grand Canyon. The park lies on a plateau from 6,500 to 7,800 feet above sea level. The Virgin River and its tributaries have cut three canyons through this plateau, Zion, Parunuweap, and Great West.

Zion Canyon is the largest and most beautiful of the three canyons. It is about fifteen miles long, and from a half mile to less than twenty feet wide. The floor of the canyon has an average elevation of 4,200 feet. Its walls are 2,000 to 3,000 feet high. At the bottom of the canyon there is a very thick layer of deep red sandstone rock. Above this is another layer, about half as thick, known as the White Cliffs. Many formations, such as those of the Great White Throne, are too steep for any kind of trail. Others are reached by trails which are steep, but wide, safe, and well marked. The wonderful view at the top more than makes up for the difficulties of the climb. The park was established in 1909 as the Mukuntuweap National Monument. The present name was adopted in 1919. Animal and plant life have returned since the region came under the protection of the National Park Service.

H.E.

ZIPPER is a term often used to mean any kind of slide fastener. These fasteners have two edges of teeth and hollows which fit into each other very snugly. A slide draws the two edges together and meshes the teeth into the hollows. The edges remain fastened until they are released again by drawing the slide back over them, unmeshing the teeth. Slide fasteners are used instead of buttons to fasten clothing, and take the place of straps and buckles on luggage, brief cases, and similar articles.

The first slide fastener was invented in 1892 by Whitcomb L. Judson of Chicago. It was a series of hooks and eyes that fastened together with a slider. Patents were obtained on the meshed-tooth type of slide fastener in 1913. The trade name, "Zipper," was given to rubber galoshes closed by slide fasteners by the B. F. Goodrich Company in 1924.

W.H.D.

ZIRCONIUM, *zer KO nih um* (chemical symbol, Zr). In its pure state, zirconium is a white, soft metallic element. It can be drawn out into fine wires or pounded into thin sheets. Zirconium is a good conductor of electric current. It was discovered in 1789 by Klaproth, a German chemist, while he was engaged in analyzing some samples of zircon from Ceylon. Zirconium belongs to the same family as the newer element hafnium, whose discovery was announced in 1923.

Zirconium is found in most parts of the world, but in such small quantities that it is considered one of the rarest of metals. It is usually found along with silica in zircon and a few other minerals. Zircon has been produced from beach sands on the east coast of Florida, from sands in North Carolina, from Brazil, and is said to occur in commercial quantities in India.

Many zirconium alloys and compounds are useful, the most useful compound being its oxide, *zirconia*. This compound is a nonconductor of electricity, is acid-proof, and is used to make brick for furnace linings and laboratory equipment, and opaque white enamel. It is also used in the manufacture of the incandescent lamps



Press Syndicate

The Zither is not often heard today, but during the 1800's it was extremely popular among amateur musicians.

which are used in much microscopic work.

H.A.Sc.

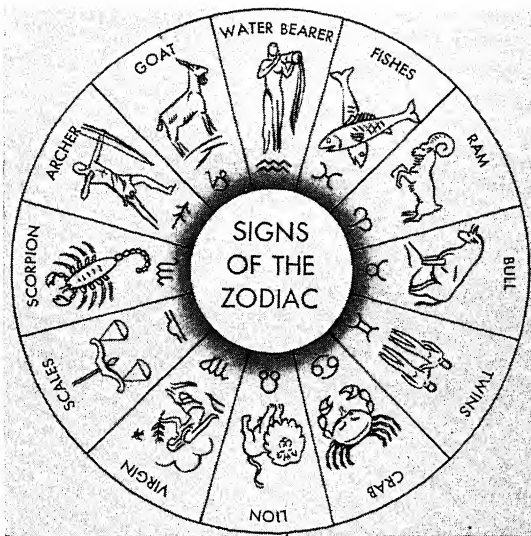
ZITHER. The zither is a stringed instrument which has musical tones much like those of a harp, lute, or guitar. The zither has from twenty-nine to forty-two strings, which are plucked with the fingers of both hands. The strings are stretched over a thin flat box rounded at one end. The zither probably developed from an ancient Greek lutelike instrument called a *cithara*. The instrument is particularly popular in central European countries, and was widely played in the United States during the late 1800's.

C.B.R.

ZODIAC, *ZO dih ak*, is the name of an imaginary belt among the stars, which includes the paths in which the sun and major planets move. This imaginary belt extends eight degrees on each side of the ecliptic, or the path taken by the sun. The term zodiac comes from the Greek *zoon*, which means a *living creature*. Nearly all the constellations, or groups of stars, in the zodiac are named after animals. These constellations are known as zodiacal constellations.

From the earliest known times, this zone has been divided into twelve parts. Each part takes up 30 degrees, and each is represented by a sign of the zodiac. Each sign of the zodiac is named after the zodiacal constellation which occupied that part of the zodiac about two thousand years ago. Today, none of the constellations occupies that part of the zodiac which bears its name. This is because the position of the sun with respect to the constellations has changed since the time the signs were first given. Each month the sun enters a new sign of the zodiac as it goes through its orbit, or path.

The twelve signs of the zodiac are based on the original Greek names, which are taken from names of animals.



The 12 Signs of the Zodiac are the basis for a type of fortunetelling called astrology. The astrologist determines which sign was prominent when the person was born. Then the position of the stars is supposed to tell on which days the person will have good luck.

These signs are as follows:

Aries	(♈), the Ram	
Taurus		
Gemini	(♊), the Twins	
Cancer	(♋), the Crab	
Leo	(♌), the Lion	
Virgo	(♍), the Virgin	
Libra	(♎), the Balance	
Scorpius	, the Scorpion	
Sagittarius	, the Archer	
Capricornus	(♑), the Goat	
Aquarius	(♒), the Water Bearer	
Pisces	(♓), the Fishes	O.J.L.

Related Subjects. The reader is referred to the articles on the constellations named for the signs of the zodiac, as **AQUARIUS**; **GEMINI**. See also **ASTROLOGY**; **HOUSE**.

ZODIACAL, *zoh DI ah kal*, **LIGHT** is a cone-shaped glow of faint light which is seen in the Northern Hemisphere soon after twilight on spring evenings, and just before dawn in the autumn. It extends upward and southward from the position of the sun. In the tropics the zodiacal light can be seen both evening and morning throughout the year. The light is brightest near the sun and shades off very gradually. It can easily be traced halfway across the sky. Some observers are said to be able to trace it completely around the sky. They say they notice a brighter area just opposite the sun, called the *Gegenschein*, which means *counterglow*, or opposite glow.

The zodiacal light is so named because it is seen against the zodiacal constellations which lie along the ecliptic, or the earth's path around the sun. The accepted explanation of the light is that large numbers of small particles of material are scattered about the inside of the earth's orbit, which reflect sunlight and become visible.

O.J.L.

ZOETROPE, *zō ee trohp*. See **MOTION PICTURE** (History of the Motion Picture).

ZOG I, *zohg*, or **ZOGU I** (1895-), was king of Albania from 1928 until Italy occupied the country in 1939. The son of the chief of the powerful Mati clan, he was born near Burgayeti. His name was originally Ahmed Beg Zogu. Zog was educated in Constantinople (now Istanbul). When World War I broke out, he opposed William of Wied who had become king of Albania, and he fought the Austrians.

After the war, Zog rose in political influence. Between 1920 and 1922, he served as Minister of the Interior and Minister of War, and finally became Prime Minister. In 1924 a revolt broke out and Zog fled to Yugoslavia. Six months later he returned with an army and resumed his power. Early in 1925 he was elected President of the Albanian Republic. Zog introduced many reforms much like the westernization measures introduced by Kemal Atatürk in Turkey. In 1928 he was named King Scanderbeg III after a former Albanian patriot, but he was officially known as Zog I. After World War II, the Albanian people rejected his claim to the throne and made the country a republic. Zog remained in exile from Albania.

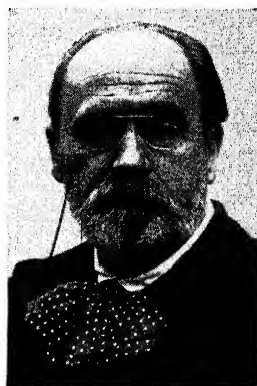
M.W.F.

See also **ALBANIA** (History and Government).

ZOLA, *zaw LAH*, **ÉMILE** (1840-1902), was one of the best known of French novelists of the 1800's. He was a leader of the naturalist movement. Zola chose to write about the unpleasant side of life and used the slums and the underworld for the background of his stories. His novel *Germinal* was the first so-called "Proletarian" novel, which deals with the struggle of the workers against their employers.

Perhaps Zola's greatest work was the series *The Chronicles of the Rougon-Macquart Family*. In these twenty volumes Zola gave a detailed, realistic portrayal of a Parisian family during the late 1800's. He traced the descendants of a mentally-ill woman through all types of society. Zola based many of his novels on cases which he found in the police records of Paris. In his passion for truth no subject was too unpleasant. *Nana*, perhaps one of his best-known novels, is the story of a woman of the streets. *The Dram-Shop*, another in the series, shows the evils of drunkenness. In *Germinal* Zola loudly called for social reform by portraying the wretched conditions in the coal mines. In these novels the forces of heredity and the forces of environment brought the characters to tragic ends. Critics attacked the ugliness and brutality of Zola's novels, but the public bought them as fast as they came off the press.

Zola, the son of an Italian engineer, was born in Paris. He was educated in Paris and Marseilles, and at twenty-two became a clerk in a publishing house in



Pix

Émile Zola, French realistic novelist

Paris. Two years later, in 1864, he wrote his first book, *Tales for Ninon*, but it had little success. In 1866 he quit his job and decided to devote his entire time to writing. The following year he wrote *Thérèse Raquin*, a stirring novel of crime and passion. It made him famous almost overnight.

Zola next began to write the *Rougon-Macquart* series. With its publication he became the greatest literary figure in France. But his search for truth did not confine itself to fiction alone. In 1898, when Captain Alfred Dreyfus was falsely accused of selling military secrets to Germany, Zola came to his defense. He published an open letter, *I Accuse*, in which he accused the army officials who had brought Dreyfus to trial of being the actual traitors. Zola was charged with libel, and was forced to flee to England. But the letter's accusations caused such an uproar that Dreyfus was given a new trial and his name was finally cleared. Zola returned to Paris and went on with his work. Three years later gas fumes from a broken flue in his bedroom caused his death. The French government gave him a public funeral. In 1908 Zola's body was transferred to the Pantheon.

L.J.

See also DREYFUS, ALFRED.

His Works include *The Fortunes of the Rougons* (the first volume of the Rougon-Marquart series); *The Hunt*; *Fruitfulness*; and *The Downfall*.

ZOLLVEREIN, *TSOHL* *fer ine*, is the German word for *customs union*. It was the name of the commercial union, or trading arrangement, which Prussia and all the other states of Germany except Austria set up in the 1800's. The Zollverein prepared the way for the unification of Germany in 1871.

At the close of the Napoleonic Wars, Germany was made up of thirty-eight separate states. Each state gloried in its own independence. It had its own tariff system, and charged customs duties on all trade. Trade was thus very difficult. In 1818 the Prussian Government abolished its internal tariffs and invited the other German states to join Prussia in wiping out their tariffs. The German states were attracted by the advantages of free trade, and one by one they entered the Zollverein. By 1866 only Austria, which had not been allowed to join, and a few other states had not become members.

When the German Empire was established in 1871, the Zollverein was replaced by the Imperial Customs Union. This union included all the German states except the free ports of Bremen and Hamburg. Bremen and most of the city of Hamburg joined the union in 1888.

J.S.S.

ZOMBA, *ZAHM bah* (population 1,000), is the capital of the Nyasaland Protectorate, in British East Africa. This town lies about seventy miles south of Lake Nyasa. Zomba is the center of a tobacco- and cotton-raising region. There are some modern European buildings, but crude native huts house most of the inhabitants.

H.V.B.K., JR.

ZONE, *zohn*. A zone is a section or division of a certain area; or of the earth itself. The word *zone* is commonly used to refer to one of the five great climate belts of the earth.

Each of the climate zones on the earth is bounded

by imaginary lines that extend around the earth in the same direction as the equator. The Torrid Zone is the widest of the five climate belts. It lies between the Tropic of Cancer on the north and the Tropic of Capricorn on the south, and extends $23^{\circ} 27'$ both north and south of the equator.

Most of the people in the world live in the North and South Temperate zones. Each of these zones is very nearly forty-three degrees wide. The North Temperate Zone lies between the Tropic of Cancer and the Arctic Circle. The United States and most of Canada are in the North Temperate Zone. The South Temperate Zone reaches from the Tropic of Capricorn to the Antarctic Circle. It takes in much of South America and the southern part of Africa.

The two Frigid zones lie north and south of the Temperate zones. Each of the Frigid zones is about twenty-three and a half degrees wide. The North Frigid Zone extends from the Arctic Circle to the North Pole. The South Frigid Zone reaches from the Antarctic Circle to the South Pole. The Frigid zones are regions of everlasting ice and snow. Almost no one lives in these extremely cold areas.

These five climate belts are bounded by definite circles which are determined by astronomical conditions. In temperature, each zone merges gradually into the adjoining zone, for there is no distinct climatic boundary.

W.E.E.

See also ANTARCTIC CIRCLE; ARCTIC CIRCLE; CLIMATE; TROPICS.

ZONE, POSTAL. See PARCEL POST (Postal Zones).

ZONED MUSHROOM. See MUSHROOM (color plate, Shelflike Brackets Grow on Trees).

ZONING. See ARCHITECTURE (How the Architect Works); CITY PLANNING.

ZONTA INTERNATIONAL is a classified service club of executive business and professional women. The organization has about 6,000 members in 160 local clubs throughout the United States, Canada, Hawaii, Iceland, and the Scandinavian countries. The chief purpose of Zonta International is to advance the legal, political, economic, and professional status of women, and to work for the advancement of understanding, good will, and peace. Local clubs carry on many philanthropic activities in the educational and social service fields. Zonta International was founded in 1919. It has headquarters in Chicago. The organization publishes a monthly journal called *The Zontian*.

ZOO is an enclosure or a park where wild animals are kept for study and for exhibition. The animals are scientifically cared for in cages, or sometimes in natural surroundings enclosed by deep ditches, or moats. The animals which live in the open have more freedom, and behave more as they do in their natural state.

The word *zoo* comes from the more proper name *zoological garden*. The first collection of animals made for scientific study was probably that of the Jardin des Plantes. This zoo was established at Paris in 1804. But kings and very rich persons have kept collections of wild animals since before the time of Christ. Zoos are now found in all parts of the world.

The main purpose of zoos is to show wild animals to the public. But zoos also give scientists much oppor-

ZOOGEOGRAPHY

tunity to study the ways of animals. The staffs of zoos include many specialists in the various fields of animal study. They find out much about the feeding and living habits of animals, as well as how disease affects various animals. Many important scientific discoveries have resulted from studies made at zoos. These discoveries alone make the cost of the upkeep of zoos worthwhile to the public.

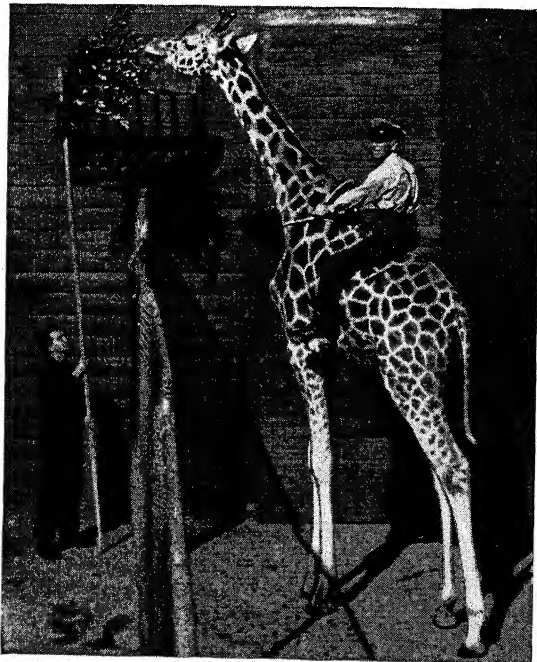
Zoos in the United States. Many cities in the United States have fine zoos. The leading ones are in Philadelphia; Chicago; St. Louis, Mo.; Cincinnati, Ohio; and in Bronx Park, New York City. The Bronx Zoo is the largest and most complete in the United States. It is controlled by the New York Zoological Society.

The United States has maintained a National Zoological Park in Washington since 1890. This park is under the direction of the Smithsonian Institution. Congress grants money to keep it up.

A number of zoos are city property, and are kept up for the benefit of the public. The largest of such municipal zoos are at Lincoln Park in Chicago, Highland Park in Pittsburgh, Pa., Belle Isle in Detroit, and Golden Gate Park in San Francisco. Brookfield, Ill., has a zoo in a forest district near Chicago. Here the animals live much as they would in nature.

Zoos in Other Countries. Canadian zoos include those in the cities of Ottawa, Montreal, Quebec, and Toronto, and at Stanley Park in Vancouver.

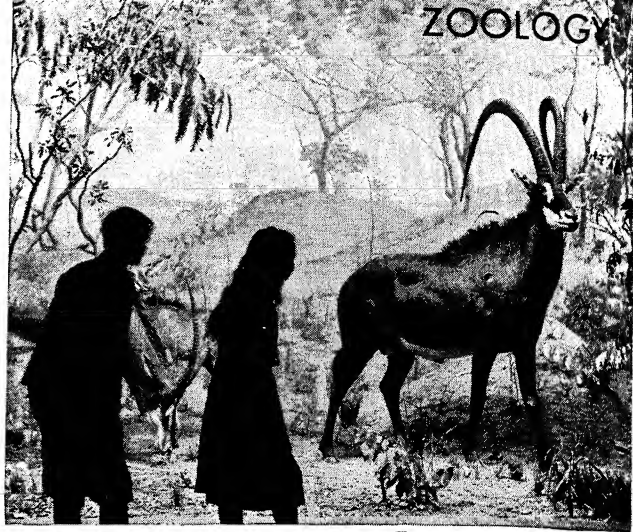
Nearly every great city of Europe has a zoo. Large ones are also found in Tokyo, Calcutta, Bombay, Melbourne, Rio de Janeiro, and Buenos Aires. C.A.



Tallest Animal in the Zoo Is the Giraffe

ZOOGEOGRAPHY, *ZOH oh jē AHG rah fih*. See Zoology (The Zoological Sciences).

ZOOLOGICAL GARDEN. See Zoo.



H. Armstrong Roberts

ZOOLOGY, *zoh AHL oh jih*, is that field of science which treats of animals, their variety, their bodily organization, and their ways of life. Together with botany, or the study of plant life, it forms part of the great department of human knowledge known as biology, the science of living things.

Zoology is a scientific field of special interest to man. We see animals all about us in our daily life. Much of our food comes from animals. Many animals, from horses to honeybees, are our friends and useful helpers. Many more animals, from tigers and poisonous snakes to mosquitoes and tapeworms, are enemies, pests, or parasites of man. Zoology helps us make better use of our animal friends and combat our animal enemies with greater success.

Man himself is a member of the animal kingdom, although he is set apart by his intellectual development. Many of the facts learned from the study of other animals give us better knowledge of ourselves. Much of our understanding of the structures and functions of the human body has been gained by studying other animals with organs and body processes similar to our own. Many of the great advances in medicine and surgery have come from scientific work on other animal forms. Even our philosophical ideas have been greatly influenced by the study of zoology, particularly through the doctrine of evolution. This doctrine is based largely on the study of animals. We cannot fully understand ourselves unless we can clearly picture the human race in its natural setting as part of the great world of living things.

The Development of Zoology

From his earliest days man knew about and observed the animal life surrounding him. The cave paintings of Stone Age men show close knowledge of the artist's animal subjects. The first true scientist whose studies of animals have come down to us was Aristotle, a Greek who lived 300 years before Christ. Aristotle wrote several works on animals. His books show that he was a keen and accurate observer. Certain of his accounts of animal development and structure were not equaled for nearly 2,000 years. A second great figure in ancient science was Galen, a Roman physician of the second century A.D. Galen described many features of the structure of higher animals. There were various other Greek and Roman writers on natural history. Most of

these were merely collectors of animal stories and at best were but superficial observers of nature.

With the decline of Rome and the coming of the dark ages, zoology, with other sciences, went into an eclipse. For a thousand years almost no scientific work was done in Europe. But in the 1200's there was a vigorous outburst of intellectual activity. Many fields of art, literature and philosophy flourished in and about the new universities of Italy and France. Not so with science. Aristotle and Galen were again read and respected as authorities, but no one studied the animals themselves. The spirit of scientific investigation was lacking.

The rebirth of zoology, and of scientific inquiry in general, began in the 1500's. Men began to look at the world and discover the truth of things for themselves instead of relying on earlier authorities. The study of medicine was the only approach to scientific work about life itself in the early universities. Therefore, many of the new zoological discoveries were made by teachers in the medical schools. The most notable worker in this field was Vesalius of Padua, who made careful studies of the structure of the higher animals and man. Vesalius shocked the men of his time by suggesting that, if a specimen dissected differed from the description by the great authority Galen, it might be Galen who was wrong, and not the animal.

During the 1600's and the 1700's, knowledge of zoology expanded greatly. Exploration of the world brought strange new animals from other continents to Europe. The microscope showed that there existed an undreamed-of world of tiny forms of life. By the close of the 1700's, the groundwork was laid for most of the fields of modern zoological study. Two major fields, taxonomy and morphology, were firmly established.

The founder of taxonomy, or the systematic classification of living things, was the great Swedish naturalist, Linnaeus. Linnaeus published in 1735 the first edition of his book on *The System of Nature*. By this time the number of animals known was already vast. The zoologist urgently needed some method of sorting out animals and arranging them in categories for consideration and study, just as a librarian must have some system under which to catalogue and arrange her books. Linnaeus devised a reasonable scheme of classification for the purpose. This scheme was universally adopted and became the framework of the modern classification of all animals.

A second great figure in zoology was the French naturalist, Cuvier, who is generally regarded as the founder of comparative anatomy. He connected earlier studies of the structure of various animals with his own observations. He pointed out that there are only a few basic body patterns among animals and that almost all forms can be regarded as belonging to one or another of these structural types. A man, a bird, and a codfish differ in many regards. Basically they have a similar body pattern, that of the backboneed animals. A lobster, an insect, and a centipede have bodies that belong to a very different structural type. Cuvier's work proved a great stimulus to further studies in animal structure. It led to the discovery of much evidence for evolution, although Cuvier himself did not believe in evolution.

Evolution. Any serious study of zoology shows that there are many series of animals which show numerous resemblances to one another, just as members of a human family tend to show common traits and features. This fact led, even in ancient times, to the suggestion that in the world of animal life as a whole, the resemblances between similar types might be due to actual blood relationship, or descent from common ancestors. In Cuvier's day this hypothesis of organic evolution was discussed by many but accepted by few. No one had adequately assembled the facts supporting the idea or given any reasonable suggestion as to how evolution might have been brought about. This was first done by Charles Darwin in his great work, *The Origin of Species*, published in 1859. In this book Darwin assembled observations and facts accumulated for decades. These tended to show the reality of evolutionary processes and gave a reasonable explanation of the way in which they operate. Within a few years almost all zoologists came to accept evolution, not as a mere supposition which might possibly be true, but as a well-established doctrine which alone adequately interpreted a great series of otherwise puzzling facts.

Darwin pointed out that all animal types show variations. Natural causes would tend to kill off the poorer variants and to select for survival and reproduction of their kind the individuals better fitted to the way of life of the species. New forms might gradually evolve through this "struggle for existence." Today, many feel that this explanation of the way of evolution is far from a complete one. The fact that evolution has taken place is, however, almost universally accepted by workers in zoology. Evolution is the guiding light in research work in many fields, such as classification, structure, animal distribution, and the study of fossil types.

Man Names the Animals

In order to discuss animals intelligently it is necessary that they have names which will have the same meaning to scientists or students the world over. One might think that this could be done by using common names, such as those familiar to us in English. But it is soon apparent that this will not suffice. For one thing, there are not enough common terms to go around. Most of the larger animals have familiar names. For smaller forms of life, there are very few names available. There are, for example, tens of thousands of flies of various sorts. For most of them we have available only the single word *fly*. Even if we add descriptive adjectives to it, as *house fly*, or *horse fly*, we are not much better off.

Besides, common names do not always mean the same thing to all persons. Several different game birds in North America are called *partridge*. No one of these birds is the same as the English bird to which the term was first applied. To a resident of the Middle West, a *gopher* is a ground squirrel. To a native of Florida, a *gopher* is a tortoise. The confusion is bad enough in a single language. It becomes hopeless when we try to translate such vague terms from one language to another tongue.

The fact that Latin was the language always used in learned works in the Middle Ages, afforded a basis for a scientific method of naming animals which became

firmly established in the days of Linnaeus. Just as an individual man has a surname and at least one personal name, so every animal is given a double name. The name is made up of two words written in Latin form (and generally derived from Latin or Greek). These names are termed *generic* and *specific*. The first (corresponding roughly to a human surname) applies to a group of very closely related animals, and the second name (frequently a descriptive adjective) picks out the special form of the group intended. The generic name is written first, just as "William Smith" is written "Smith William" in a telephone directory. For example, the dog and its close relatives, such as the wolves and jackals, are included in the genus *Canis*, from the Latin for *dog*. Within the genus the familiar domestic dog is distinguished as the species *Canis familiaris*, the western coyote *Canis latrans*, the European wolf *Canis lupus*. The generic term may be used by itself to refer to all the species included in the genus. *Canis* therefore means the doglike animals. The specific name, however, is never used separately, any more than one would (outside the family circle) speak of "William" without specifying that it was the Smith William rather than a member of the Joneses or Browns who was being discussed.

This system gives us the possibility of an international system of naming. These animal names may mean the same thing to speakers of every language and refer to precisely the same animal, everywhere and always.

How the Animals Are Classified

We have noted earlier that Linnaeus first evolved a workable system for classifying animals in orderly fashion, arraying the species in genera, and placing the genera in groups which are more and more comprehensive in nature. As first designed, this system was merely a convenient way of neatly pigeonholing animals, although Linnaeus and other early workers quite naturally tended to put animals similar to one another into the same categories. With the acceptance of the idea of evolution came the belief that the scheme of classification should be (as it already was, in great measure) a "natural" one.

We can think of the evolution of the animal kingdom as having taken the shape of a great "family tree." The ancestral forms are placed toward the base of the trunk, the living species are the leaves at the twig tips. To fit with the evolutionary facts, the major divisions in the classification should represent the main limbs of the family tree, and the small divisions, its branches and twigs.

Modern classifications, we believe, go a long way toward attaining this ideal. But we are far from perfection. There are so many animals (close to 1,000,000 known species, 200,000 genera as a rough count) that it is impossible to know each one well enough to place it precisely. Certain kinds of animals show such puzzling combinations of characters that we cannot be sure of the proper group to which they belong. As a result, our classifications still contain many points in which we are in doubt. In addition, even where there is agreement as to the facts of relationships between two or more groups, there may be different opinions as to the way these relationships should be expressed in a classification or as

to the terms to be used. In consequence classifications of animals given by different authors may differ markedly, in spite of a general agreement between them as to the fundamental facts of relationships.

Only six basic terms, which designate increasingly wider categories in the classification, are needed to locate the position of any form in the animal kingdom. These are, from smaller to larger groups: (1) *species*, (2) *genus*, (3) *family*, (4) *order*, (5) *class*, (6) *phylum*. Where intermediate steps are needed for further refinement of classification, we may create them by using prefixes — *super-*, meaning above, *sub-* meaning below, *infra-* meaning among — to these terms.

As a practical example of the use of these terms, we may follow through the classification of the dogs, already discussed as to genus and species. The members of the genus *Canis* are clearly related to the foxes and other rather doglike animals. All these are included in the family *Canidae* (a family always takes the name of a typical genus with the suffix *idae*). A number of other families of flesh eaters, such as the cats, weasels, and hyenas, are fairly similar to the dog group and are believed to have come from a common ancestor. These families constitute the order *Carnivora*. These carnivores, in common with a variety of animals from men to cows, elephants to mice, bats to whales, show such common characters as the warm-blooded condition, presence of fur or hair, and the practice of nursing the young. These are features which characterize the class *Mammalia*. Mammals are, with the other backboned animals — birds, reptiles, amphibians and fishes — members of the subphylum *Vertebrata*. Together with certain lowly marine relatives, the vertebrates form the phylum *Chordata*, a major subdivision of the kingdom *Animalia*.

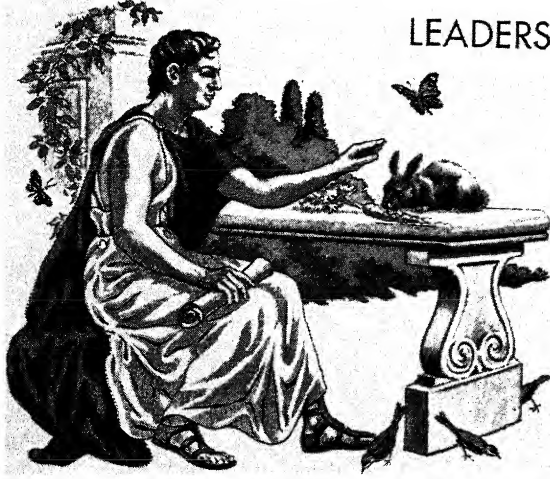
Classification of Principal Animal Groups

Below are given brief descriptions of the major subdivisions of the animal kingdom. We can do little here except give a brief characterization of the principal phyla. Many of the phyla or classes mentioned are treated in special articles elsewhere in this encyclopedia. As the systems of classification have changed, older terms have dropped out of use. For example, *Pisces* once applied to all fishes. Then the agnatha were taken out of the class, and *Pisces* is no longer commonly used.

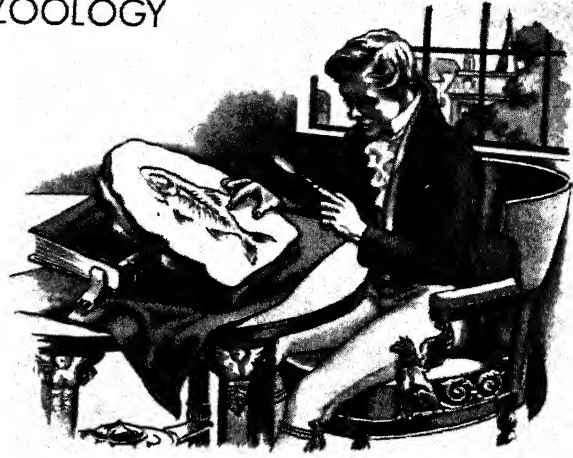
The animal kingdom is customarily divided into two subkingdoms of very unequal size. The first includes only the phylum *Protozoa*, or animals formed of but a single cell. All the remaining phyla are included in the subkingdom *Metazoa*, more highly developed animals made up of many cells.

I. Phylum Protozoa. The one-celled animals are the base of the entire animal world. In some cases they are very similar to the simplest plants, from which they have presumably arisen. Almost all protozoa can be seen only through a microscope, although some progressive types form colonies of cells visible to the naked eye. A drop of ditch water will usually contain a variety of protozoan types. Some swim by the lashing of a whiplike organ called a *flagellum*, others by a "rowing" motion of numerous little hairlike structures called *cilia*. Still others (as in the case of the familiar *Ameba*) move about by a flowing motion of their cell substances. Many protozoa live as parasites in higher organisms, and cause such diseases as malaria and sleeping-sickness.

LEADERS IN ZOOLOGY



Aristotle (384-322 B.C.), of Greece, was the first to classify animals by structure. Scientists used his classifications for hundreds of years, though many were incorrect.



Georges Cuvier (1769-1832), of France, was one of the first men to study fossil bones scientifically. He also brought scientific method into the study of animal structure.



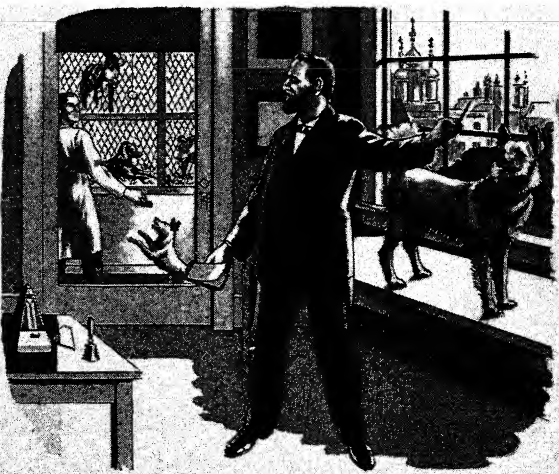
Louis Agassiz (1807-1873), of Swiss birth, carried on Cuvier's work with his investigations of fossil fishes. Agassiz was a great authority on animals of the sea.



Thomas Huxley (1825-1895), of England, was the friend and champion of Darwin, whose work on evolution stirred great controversy. Huxley studied ocean life in Australasia.



August Weismann (1834-1914), of Germany, showed that acquired characteristics could not be passed on to offspring. He was a pioneer in the study of heredity.



Ivan Petrovich Pavlov (1849-1936), of Russia, explained how nerve and muscle actions, called reflexes, took place. His work showed the close connection between mind and body.

II. Phylum Porifera includes the "pore animals," or sponges. These creatures which grow fixed to one place show a great advance over the protozoa in that their bodies are made up of numerous cells, although their organization into a body is a rather loose one. The sponge body is essentially a sac, with numerous small pores at the sides. The water that passes through the pores is strained to provide food particles. The body is stiffened by the secretion of numerous small hard spicules, often star-shaped, which form the skeleton. The bath sponge is such a sponge skeleton.

III. Phylum Coelenterata. The coelenterates include such simple animals as the sea anemones, corals, and jellyfishes. The body consists of a simple sac, lined inside and out by compact layers of cells which are decidedly different from each other. This primitive body plan is basic to that of all higher animals. The interior of the sac is a primitive digestive tract. It has but a single opening serving as both mouth and anus. The inner layer of cells is known as the endoderm (inner skin) and corresponds to the lining of the gut of higher animals; the outer layer is termed ectoderm (outer skin) and corresponds to at least the outer part of the skin in more advanced types. There is little trace, however, of a third body layer which in more advanced animals lies between the other two and forms much of the bulk of the body. Coelenterates are inactive, and are at best floating rather than actively swimming forms. Generally they remain attached to one place. The various parts of their bodies are arranged in circular fashion around the mouth as a center. The *Ctenophora*, which include the comb jellies, were once considered part of the *Coelenterata*, although many now consider them a separate phylum.

IV. Phylum Platyhelminthes (flatworms). This phylum (and the next as well) includes a series of wormlike animals unimportant in themselves. They are of interest in showing improvements in body structure which point the way toward the more progressive and highly-developed phyla of animals. Of the flatworms, some are small free-dwelling inhabitants of streams and ponds. Others, such as liver flukes, blood flukes, and tapeworms, have become parasites. There are in these forms two notable advances over the coelenterates. The body of the platyhelminth is bilaterally symmetrical, or with one side a mirror image of the other, as in most active and progressive animals. Further, there is a third body layer—the mesoderm—filling out the body between inner and outer surfaces.

V. Phylum Nematoda (roundworms). These are small round-bodied, wormlike animals. Most well-known types are parasites of varied kinds. They include the small worms such as the hookworm and the trichina, frequently present in the intestines of man and higher animals. The basic body plan shows a progressive feature lacking in the flatworms. The gut now has a separate mouth and anus instead of the primitive single opening. The *Gordiaceae* are usually included with the Nematoda. The roundworms were once considered in the phylum *Nemathelminthes*.

VI-XII. We here briefly list several phyla which are of little evolutionary interest and for the most part contain but a small array of animals. *Nemertinea* are simple wormlike marine forms which catch their food by throwing out a long tongue-like proboscis. *Nematomorpha*, the hairworms, are slender water dwellers, popularly but incorrectly believed to be animated horsehairs. *Rotifera*, or wheel animalcules, are tiny water dwellers little larger than many protozoans. The rotifers were once considered to belong to the phylum *Trochelminthes*. *Polyzoa* include the "moss animals," or bryozoans. Polyzoans are small marine animals which form plantlike colonies attached to the ocean floor. *Brachiopoda*, or the lamp shells, are stalked marine forms covered by a pair of shells. The shells of a brachiopod superficially resemble

those of mollusks. *Phoronidea* are rare tiny marine tube dwellers. These last three phyla were once considered to be part of a separate phylum, the *Molluscoidea*. *Chaetognatha*, or arrowworms, are slender transparent arrow-shaped marine forms, perhaps related to echinoderms and chordates.

XIII. Phylum Annelida (segmented worms). With the annelids we arrive at a series of three phyla, related to one another, which in many ways are the most highly evolved of animal types except for the vertebrates. The common earthworm is an example of the annelids, but a rather degenerate one. Many more progressive types are found in the seas. The leeches are also annelid worms. A feature of the group is the dividing of the body into segments. These segments consist of a series of rings. Many of the basic body structures are repeated in each ring. The annelids not only have a middle body layer, but have developed within it a body cavity in which many important organs are located. The nervous system and a system of blood vessels are well developed, although on a very different plan from that seen in ourselves and our vertebrate relatives.

XIV. Phylum Arthropoda. The joint-footed animals appear to have developed from the annelids or forms closely related to them, and have many features in common with that group. The body is stiffened by a hard armorlike skin over the body and the characteristic and numerous jointed limbs. Important classes are: *Crustacea*, water dwellers such as the lobsters, crayfish, and crabs; *Arachnida*, mainly land forms such as the spiders, but including the scorpions and horseshoe crabs; *Myriapoda*, the centipedes with myriad legs; and *Insecta*, with three pairs of legs and, generally, wings in addition. With perhaps 600,000 known species, the insects are to be regarded in some respects as the most successful of all animal groups.

XV. Phylum Mollusca. The mollusks include a variety of forms, mainly living in the ocean. The body itself is soft and rather shapeless, but is enclosed in a mantle which usually secretes a hard shell. The shell varies greatly—bivalved in the clams, mussels and oysters, for example; spirally coiled in the snails; or much reduced in the active squids and octopods. Although their development shows that the mollusks are related to the last two groups, they differ from them in many features, such as the absence of segmentation.

XVI. Phylum Echinodermata (spiny-skinned animals), such as the starfish, sea urchins, and sand dollars. These are slow-moving animals and in one group (the crinoids, or sea lilies) are stalked. In relation to this, the echinoderms have reverted to a radial type of symmetry as adults, although the larvae are bilaterally symmetrical. A special feature of the group is the development within the body of a series of water-filled tubes from which project numerous small movable "feet" used in locomotion. The echinoderms are but distantly related to any of the phyla so far discussed. Unlikely as it would seem from their appearance as adults, their development indicates that they are more or less related to the chordates.

XVII. Phylum Chordata, including the backboneed animals and some related primitive types. All of the chordates possess many advanced structural features, but they are developed on a very different plan from such groups as the annelids or arthropods. The body is bilaterally symmetrical and partially divided into segments. All possess, either as embryo or adult, gill slits or pouches which serve as breathing organs in water-dwelling members of the group. A nerve cord is developed along the back. (This structure is on the under side in annelid worms and arthropods.) The members of this group generally have a long flexible rod, the notochord, stiffening the body. Four subphyla are distinguished.

A. *Hemichorda*, the acorn worms. They somewhat re-

semble the annelids superficially, but differ in internal structure. The body ends at the front in a proboscis with a collar at its base. This gives them the appearance of an acorn and its cup. As the name implies, the notochord is poorly developed.

B. *Urochorda*, the tunicates and sea squirts. As adults these are either attached to a support or floating organisms which consist of little but an elaborate set of gills. The nerve cord and notochord, however, are usually present in the tail of a tadpolelike larva.

C. *Cephalochorda*. The typical cephalochordate is *Amphioxus*, a small translucent marine animal that is fishlike in appearance but more primitive in structure. Gills, nerve cord, and notochord are all present.

D. *Vertebrata*, the backboneed animals, with a well-developed skeleton, including a backbone or vertebral column which replaces the notochord, and with other progressive features. There are seven living classes of vertebrates:

1. *Agnatha*, jawless vertebrates, the lampreys and hagfishes (cyclostomates).
2. *Chondrichthyes*, cartilaginous fishes, the sharks and skates with jaws but lacking bone in the skeleton.
3. *Osteichthyes*, the progressive bony fishes, including most familiar fish types.
4. *Amphibia*, such as frogs, toads, and salamanders, leaders of "double lives" in water and on land, and the first vertebrates with developed legs suitable for land life.
5. *Reptilia*, such as turtles, lizards, snakes, and crocodiles, which have made a great advance in the development of a shelled egg which can be laid on land.
6. *Aves*, the birds, progressive feathered flying descendants of the reptiles.
7. *Mammalia*. Man and related types. Mammals are warm-blooded, large-brained creatures clothed in hair or fur, who nurse their young and usually bear them alive. To place ourselves in the classification, we may note that man is a member of the order *Primates*, which includes lemurs, monkeys, and apes as well, and within the order, modern man, as *Homo sapiens*, is the only living species of a special family, the *Hominidae*.

The Zoological Sciences

Although one may make an elementary study of zoology as a whole, the field is so vast that most workers confine their attention to some special aspect of the subject. A number of branches of zoological science have been established. Some of these subsidiary sciences deal with special groups of animals. Entomology, for example, treats of insects, ornithology of birds. Still other sciences, some of which will be noted here, deal with special aspects of all the various groups. We have already described the subject of *taxonomy* in describing the nomenclature of animals and the system employed in animal classification. Like taxonomy, there was early established the science of animal structure, *morphology*.

The description of the major structural features of animal bodies is usually termed anatomy. Comparative anatomy is closely related to evolutionary studies. The fine structure of the body tissues is the field of *histology*. For purposes of study thin slices are prepared, stained with various dyes and viewed under the microscope. With still more refined microscopical techniques one may study the structure of individual body cells, the science of *cytology*.

Many interesting lines of research are offered by a

study of the reproductive processes of animals. In general the development of a new individual is begun by the union of two cells, egg and sperm, from female and male parents, respectively. Each of the two contains within a central area, or nucleus, complex chemical materials which may present the appearance of rodlike structures called chromosomes. The chromosomes appear to be the bearers of hereditary materials. The union of egg and sperm nuclei produce in the new individual a combination of characters from both parents. Much light on heredity has come from careful study of these germ cells. Still more has been gained from breeding experiments in the field of *genetics*, a science which has grown to importance in recent years. This type of work has been responsible for valuable improvements in our breeds of domestic animals and has shed much light on human heredity.

The study of development from the egg is the science of *embryology*. The mode of development from the seemingly simple egg to the complex adult body sheds much light on the origin of body structures and furnishes many clues to the classification and evolutionary position of animals. The growth stages have been accurately observed in a great variety of animals. Many embryologists are currently engaged in the attempt to discover the complicated physical and chemical processes that underlie development. Growth does not stop at birth; changes go on (although at slower speed) through infancy, youth, and maturity to old age. A better knowledge of these changes would be of great benefit to mankind.

Parallel to the development or morphology, the science of structure, has been the growth of *physiology*, the science of bodily function. How a nerve fiber transmits an impulse, how a muscle contracts, the way in which various food substances are absorbed, circulated and used in the body — these are but a few of the many problems studied by the physiologist. Many questions of this sort are still unanswered. The ultimate problem of the nature of life itself is still nearly as mysterious as ever. In various regards, however, bodily functions can be explained in terms of chemical and physical processes, and borderline sciences, *biochemistry* and *biophysics*, have appeared to study problems in these categories.

Psychology is the study of intelligence, or the work of the brain. Much of the interest in the field is naturally centered on that complex creature man. The investigation of animal psychology has been helpful in our understanding of the human mind. Observation of the way in which a rat learns a maze or a caged chimpanzee "thinks out" the problem of reaching for food beyond the reach of his arms may show mental processes basically similar to those found in man, although of a simpler type.

Ecology treats of the environment in which animals live, and studies the various factors which cause an animal to flourish in one type of surroundings and perish in another. Many of these factors are physical or chemical: temperature, light, moisture, for example; and, in the case of water dwellers, the amount of salt in the water, and the depth and pressure of the water. Equally important in many cases is the biological en-

vironment found in a given locality or animal community. This includes the types of plants and animals — useful, friendly, or enemies. Associated with this study is *zoogeography*, dealing with the distribution of animals in the various regions of the world. Why, for example, are polar bears found only near the North Pole, penguins only near the South; opossums in both American continents, but not in the Old World? The presence or absence in present or past times of land connections between continents, or barriers of different types — seas, mountains, differences in climates — are among the factors involved in animal distribution.

Pathology deals with the diseases of animals. As in some of the other sciences mentioned, interest here has been mainly centered on human diseases. However animal pathology has been actively studied not only from the interests of pure science but also because of its practical application to the diseases of domestic animals and because much of the knowledge gained can be applied to our struggle with human ills.

A biological field bordering the science of geology is that of *paleontology*, the study of the animals of past ages. Invertebrate paleontology, dealing with lower animals, furnishes a valuable aid to the geologist; the various shells found in different rock deposits give evidence of their relative age. Vertebrate fossils have furnished much of the story of the evolution of the higher animals.

A.S.R.

Related Subjects. The reader is referred to the ZOOLOGY section and to the list of Naturalists in the Biography section of the READING AND STUDY GUIDE. A few articles of general interest are:

ANIMAL GROUPS

Amphibian	Echinoderm	Myriapod
Arachnid	Fish	Protozoan
Arthropod	Insect	Reptile
Bird	Invertebrate	Rotifer
Coelenterate	Mammal	Vertebrate
Crustacean	Mollusk	Worm

BRANCHES OF ZOOLOGY

Anatomy	Genetics	Paleontology
Biochemistry	Herpetology	Pathology
Ecology	Histology	Physiology
Embryology	Ichthyology	Psychology
Entomology	Morphology	Taxonomy
Evolution	Ornithology	

UNCLASSIFIED

Animal	Fauna	Vivisection
Classification	Taxidermy	Zoo

ZORACH, ZO rahk, WILLIAM (1887-). See SCULPTURE (Sculpture of Today).

ZORN, tsohrn, ANDERS LEONHARD (1860-1920), was a Swedish painter and etcher. He was especially successful at portraits and scenes of everyday life. His best works are his etchings, which show brilliant light effects, and critics rank him as one of the greatest etch-

ers of his time. Zorn was born in Mora, of peasant parents. He studied at the Academy of Fine Arts in Stockholm and later set himself up as a portraitist. Zorn traveled through Italy, Spain, England, and the United States. From 1888 to 1896 he lived in Paris, w.sr.

His Works include "Baking in Mora"; "Summer in Sweden"; and "Portrait of Ernest Renan," an etching.

ZOROASTER, zoh roh ASter, also called ZARATHUSTRA, was an ancient Persian prophet who founded the Zoroastrian religion. His teachings became the guiding light of Persian civilization. Cyrus the Great and Darius the Great, the mighty rulers of Persia, spread his religion throughout their empire. When Alexander the Great conquered Persia, Zoroastrianism began to die out, but it revived during the early days of Christianity. Today the teachings of Zoroaster are the basis of the Parsee religion in India.

Little is known about Zoroaster. He is believed to have lived about six hundred years before Christ. According to the *Zend-Avesta*, the sacred book of the Zoroastrian religion, he was born in Azerbaijan. He was an unusual child, and at an early age, he began to have visions. Zoroaster is supposed to have spent his early manhood in the wilderness studying and working out the principles of Zoroastrianism. At the age of thirty he started out to preach his new religion about a supreme being called Ahura-Mazda, but no one would listen to him. About twelve years later he converted King Vishtasp, and the king spread the new religion by force. Zoroaster is believed to have been killed at the age of seventy-seven during an invasion of Persia by the Turanians.

W.W.S.

See also ZOROASTRIAN.

ZOROASTRIAN, zoh roh AS trih an. Zoroastrianism is the religion founded by Zoroaster, a Persian philosopher. The Bible of the Zoroastrians is the *Zend-Avesta*, or *Avesta*. The early parts (*Gathas*) contain Zoroaster's fiery prayers to the one and only God, *Ahura-Mazda*. He speaks "as friend to Friend." The God of the *Gathas* has six names. He is Good Thought, the Beauty of Holiness, Righteousness, Perfect Health, Dominion, and Immortality. Zoroaster taught that even the wicked are finally saved. The righteous ones go directly to paradise, while the wicked must first be purified in hell. The *Gathas* teach that the greatest virtues are pure thoughts, good words, and righteous deeds. The greatest evil is the lie.

The later poems and essays of the *Avesta* were probably the work of priests or ancient singers. These priests believed in Zoroaster's one god, but wanted to sing also to the forces of nature. The *Vendidad* part of the *Avesta* gives the laws of the religion. It contains some of the most useful hygienic laws written before the start of modern medicine.

There are a number of small sects of Zoroastrians. One of these is a group of fire worshipers in Iran called Ghebers.

G.N.MAY.

See also MAGI; PARSEE; TOWER OF SILENCE; ZOROASTER.

ZOUAVE, zoo AHV. Zouaves are soldiers of certain infantry regiments in the French army. The name comes from that of the *Zouaoua* tribe of Kabyles in Algeria, where Zouaves were first recruited in 1830. At first the



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Anders Zorn, modern Swedish painter and etcher

Zouave regiments were battalions made up of natives as well as Frenchmen. Later the races were separated, but the French Zouaves continued to wear the native dress. The native Algerian regiments are called *Tuross*. The Zouaves fought with distinction with Free French forces in North Africa in World War II.

Zouaves wear an unusual, bright colored uniform, with a short jacket, baggy red or blue trousers, leggings, and a tassled cap or turban. They drill with a short, snappy step.

A group called the Papal Zouaves was organized in France in 1860 for the protection of the Papal States. They were disbanded in 1871 after the siege of Paris. The Zouave uniform was worn by two Federal regiments, the Ellsworth Zouaves and the New York Fire Zouaves, during the War between the States.

R.Col.

ZUCCHINI, *zoo KE nee*, or **ITALIAN SQUASH**. See **PLANT** (color plate, Vegetables Unknown to Our Forefathers).

ZUGSPITZE, *ZOOG spitz*, a mountain peak. See **GERMANY** (Location, Size, and Surface Features).

ZUIDER ZEE, *ZI der ZA*. This arm of the North Sea penetrates into the southern coast of The Netherlands. The West Frisian Islands lie in the Zuider Zee. The Zuider Zee once was a lake in the middle of a large swampland. It became an ocean gulf as a result of floods which occurred from the 1100's to the 1300's. The Zuider Zee averages less than fifteen feet deep at low water. Its greatest length, from north to south, is eighty-five miles. Its greatest breadth is forty-five miles, and its area is a little over 2,100 square miles.

H.U.S.

ZULULAND, *ZOO loo LAND*, is the northeastern part of Natal, one of the provinces of the Union of South Africa. Zululand covers an area of 10,427 square miles. It lies along the Indian Ocean between the southern edge of Swaziland and the lower Tugela River. The land slopes upward from a low coastal plain to high mountains in the interior. Zululand is the home of the Zulus, who are among the fiercest and bravest of native African peoples.

Zululand has a population of about 258,000. Only about 4,000 of these people are white. The Zulus are Negroes of Bantu stock. They are tall, well built, and handsome. They live in *kraals*, or villages made up of huts arranged in a circle. The villagers keep their cattle inside the kraal in order to protect them. A headman controls each kraal. He is responsible to the Union Government. Farming and cattle raising are the chief



Ewing Galloway

The Zulu Courtship is on a very practical basis. Most of the courting consists of bringing gifts. This young warrior holds in his arms the key to success, a fine white goat.

industries. Since 1905, white men have owned vast sugar-cane plantations near the coast. Cotton-raising has also been introduced.

The British seized Zululand in 1887. Ten years later the territory became part of Natal, which was then a British colony. In 1906 the natives revolted against the white men. The rebellion was suppressed and the Zulu leaders were killed. Lasting peace followed the war, and there has been no revolt against the Union of South Africa. The last Zulu king was Dinizulu, the son of a famous ruler named Cetewayo.

H.V.B.K., Jr.

See also **AFRICA** (illustration); **BANTU**.

ZUÑI, *ZOO nyee*. See **INDIAN, AMERICAN** (Village Dwellers of the Southwest; Table of Tribes [Pueblos]).

ZUÑI MOUNTAINS. See **NEW MEXICO** (Location, Size, and Surface Features).

ZUNZ, *tsuonts*, **LEOPOLD** (1794-1886), has been called the founder of the scientific study of Judaism. He was born in Detmold, Germany, but spent the greater part of his life in Berlin. In 1819 he helped to found the Society for Jewish Culture and Knowledge, and from that time on published many works about the literature and history of the Jews. He was the first man to make a scientific study of the prayers and poetry used in the services of the synagogue. He also made studies of many other aspects of the whole subject of Judaism. See also **JUDAISM**.

I.J.R.

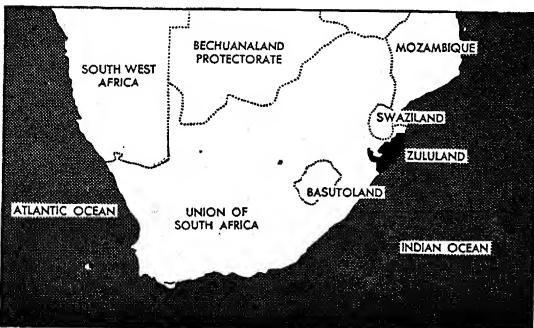
ZURICH. See **SWITZERLAND** (Cities).

ZURICH, LAKE. See **SWITZERLAND** (Rivers, Waterfalls, and Lakes).

ZUTPHEN, *ZUT fen*, **BATTLE OF**. See **SIDNEY, PHILIP**, Sir.

ZUYDER ZEE, *ZI der ZA*. See **ZUIDER ZEE**.

ZWEIG, *tsvyk*, **ARNOLD** (1887-), is a German writer of novels, plays, and essays. He is best known for his series of three novels, *Young Woman of 1914*, *Educa-*



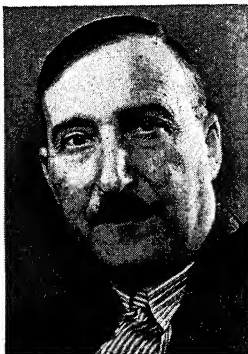
Location Map of Zululand

tion *Before Verdun*, and *The Crowning of a King*. These books give the story of World War I. He also wrote many short stories, as well as numerous essays on literature, politics, and Jewish problems. He was born in Gross-Glogau, Germany. Zweig was exiled from Germany at the beginning of the Jewish purge in 1933. In 1934 he became a resident of Palestine. F.B.O.

His Works include the plays *Ritual Murder in Hungary* and *Die Sendung Semaels*; and the novels *The Case of Sergeant Gricha* and *The Living Thoughts of Spinoza*.

ZWEIG, STEFAN (1881-1942), was a well-known Austrian writer of psychological novels and stories, lyric poems, and biographies. Most of his writings show his strong pacifist beliefs.

He grew up in Vienna, and later moved to Salzburg. His Jewish ancestry forced him to leave his country in the early 1930's. From 1934 to 1940 he lived in London, and he became a naturalized British subject. He then divided his time between New York City and Brazil. He and his wife committed suicide at Petropolis, Brazil, in 1942 because they were depressed by the state of the world and their personal affairs. F.B.O.



Schaal, Pix

Stefan Zweig, Austrian author of novels and poems

His Works include the novels *Amok*, *Conflicts*, *Kaleidoscope*, *The Buried Candelabrum*, *Beware of Pity*, and *The Tide of Fortune*; and the plays *Jeremiah* and *Volpone*. His biographies include studies of Romain Rolland, Marie Antoinette, Erasmus, and Ferdinand Magellan.

ZWILGMEYER, ZVILG myr, **DIKKEN** (1859-1913), was a Norwegian writer of books for young people. She was born in Trondheim, but at about the age of six she moved to Risør, a small seacoast town, where her father was the town judge. Most of her *Inger Johanne* stories describe her life and that of her playmates. B.F.

Her Works include *What Happened to Inger Johanne*; *Inger Johanne's Lively Doings*; and *Johnny Blossom*.

ZWINGLI, TSVING lee, **HULDRICH**, or **ULRICH** (1484-1531), was a Swiss clergyman who led the Protestant Reformation in his country. He was one of the first persons to object to certain practices of the Roman Catholic Church and to demand reforms. Zwingli preached against fastings and the veneration of saints, and insisted that priests should marry. But above all, Zwingli preached against the political power of the Pope.

Zwingli was born at Wildhaus, in the canton of Saint Gall. He studied at Basel and Bern, Switzerland, and at the University

of Vienna. From 1506 to 1516 he was a parish priest at Glarus. For a time he served as chaplain for Swiss troops in Italy. On his return to Glarus he began to protest against the practice of using Swiss troops as paid, professional soldiers in European wars. His writings made him very unpopular, and he was forced to leave Glarus.

In 1516 Zwingli settled at Einsiedeln and began to preach his ideas of reform. Three years later he was called to Zurich as "priest of the people." Here he began to carry out the doctrines and ceremonies he favored. In 1520 he came to the support of the German reformer Martin Luther and openly opposed the Pope. Most of Switzerland sided with him and in 1523 Zurich broke with the Roman Catholic Church. In the following year, Zwingli married in order to carry out his teachings.

Zwingli and Luther disagreed about several doctrines in the Reformation, especially that of the sacrament of the Lord's Supper, and the movement began to split up. In 1529 they held a conference at Marburg in a last attempt to patch up their differences, but they did not succeed. Zwingli's group broke away, and years later became a part of the Calvinist movement.

In 1531 Zwingli's preachings led to a war between Zurich and the five Catholic cantons of Switzerland. Zwingli hoped to conquer the opposing cantons and unite them with his Protestant confederation, but his forces were defeated. He himself took part in the war as a chaplain with the troops, and was killed at the battle of Kappel. W.W.S.

See also REFORMATION.

ZWORYKIN, ZWOHR ih kin, **VLADIMIR KOSMA** (1889-), was one of the first scientists to develop the possibilities of modern electronic television. Perhaps his most important invention in this field is the iconoscope, an electronic tube by which light rays are changed into electric signals which can then be changed to radio waves. This invention was a great improvement over the old mechanical methods of transmitting television pictures. Zworykin also developed the modern electron microscope.

Zworykin was born in Mourom, Russia, and studied at the Petrograd Institute of Technology and at the Collège de France. In 1919 he settled in the United States where he became a research engineer with the Westinghouse Electric Company. Here he began to study the problems of television. In 1942 Zworykin became associate director of the Radio Corporation of America Laboratories, where he developed many phases of television. R.D.R.

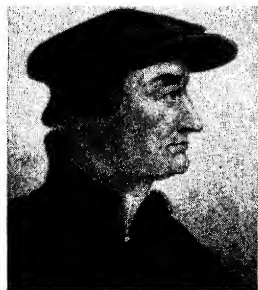
See also ELECTRON MICROSCOPE; ICONOSCOPE; TELEVISION.

ZYGOTE, ZI goht. See FERTILIZATION.

ZYMASE, ZI mayz. See ENZYME; YEAST.



Vladimir Zworykin, pioneer in radio and television



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Huldreich Zwingli led the Protestant movement in Switzerland in the 1500's.

